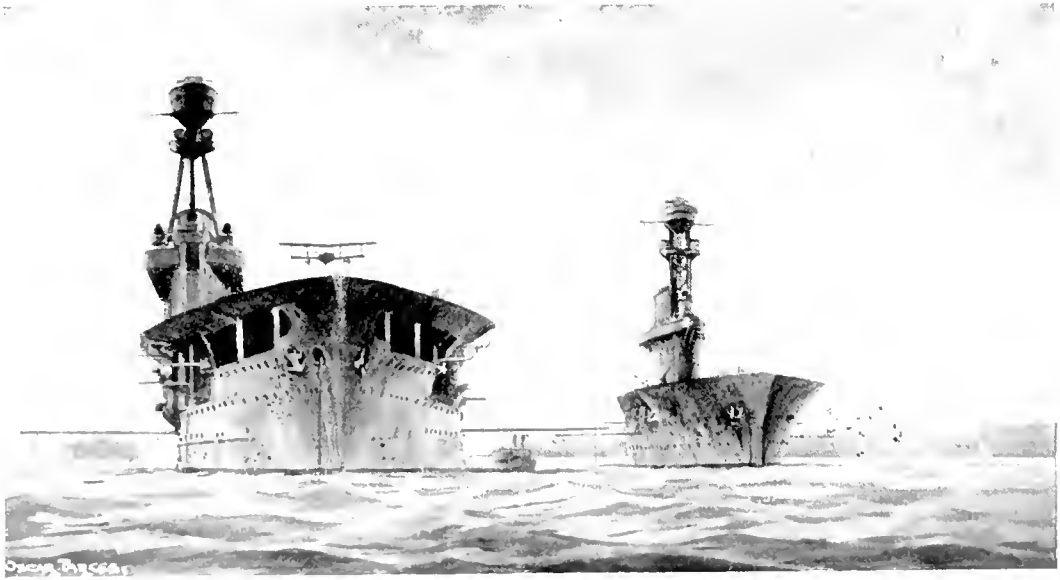


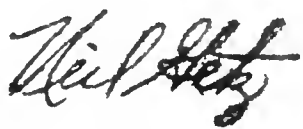
HERMES

From a drawing by Oscar Parkes.

SHIPS OF THE ROYAL NAVY

BY

OSCAR PARKES, O.B.E., M.B., Ch.B.
(*Editor "Fighting Ships"*)



1922

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CONTENTS

NOTE.—The following abbreviations have been used in the text.

B.S.—Battle Squadron.

C.S.—Cruiser Squadron.

L.C.S.—Light Cruiser Squadron.

(D).—Destroyer Flotillas.

S.L.—Search Light.

A.A.—Anti-Aircraft Guns.

H.P.—Horse Power.

Dimension figures are for over-all length, beam and maximum draught.

FOREWORD

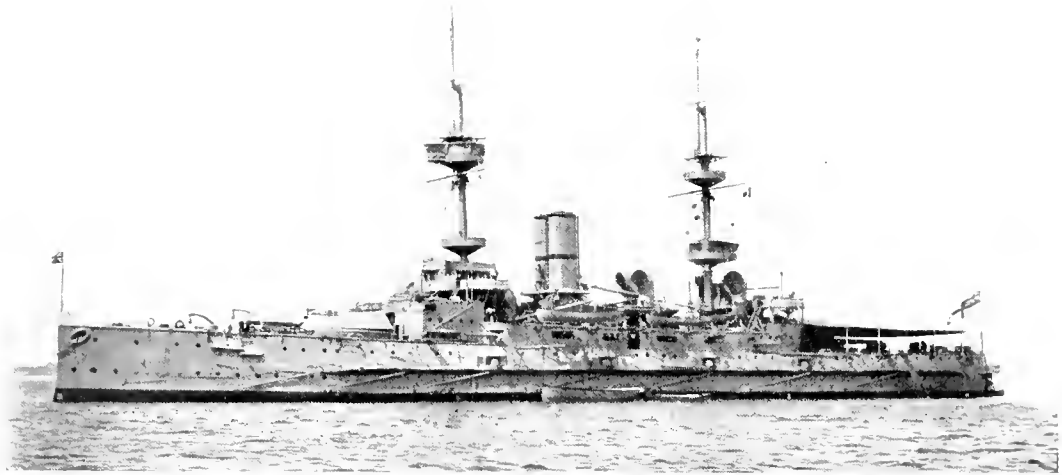
This book is written for those who feel more than a passing interest in what is still our First Line of Defence ; to whom a ship should be a living entity, something to be recognised and understood with a little of technical knowledge and a memory of what has been and not merely to be regarded as a grey hulk of steel with a name. To those who would seek acquaintance with the Fleet, the present naval literature seems either too technical, or else not sufficiently so—there is no happy medium between the naval annuals and the picture books. For this reason my aim has been to try and steer a middle course and to treat with the various types of ships in a semi-technical way which I hope will be neither too advanced for the ordinary reader, nor too elementary for those with a more critical knowledge.

At the present moment the Navy is going through a period of depression. New construction is languishing, the Washington Treaty has caused a clean sweep to be made of all the older battleships and battle-cruisers, and smaller vessels which would normally be maintained in reserve for many years to come are constantly being placed on the sale list. For all that, the passing of the old order tends to emphasize the importance of the gradual transformation of the Fleet which is proceeding almost unnoticed. By far the most interesting units which will soon be put into commission are the aircraft carriers **" Eagle "** and **" Hermes "** and by the courtesy of the Directors of Naval Construction and Naval Intelligence I have been enabled to prepare and include sketches of these ships as they will appear when completed ; the same applies to the **" Emerald "** a new light cruiser. In these classes of ships naval rivalry is steadily growing, and in the " carriers " we have already gained a substantial lead, both in numbers and design. No other nation has as yet completed a fast carrier, or for a long time will have the material for experimental purposes which we now possess, while the possibility of carrying the aerial offensive to enemy coasts by such means is likely to act as a strong check upon indiscriminate air raids in future wars. As regards the details given for the various classes, I have drawn upon data culled from " Fighting Ships " and official sources, and such short notes as the exigencies of space have permitted are the result either of personal observation or trustworthy information. It is proposed to publish a fresh edition of this book each year, and for that reason I shall welcome criticism and suggestion as to its scope in the future.

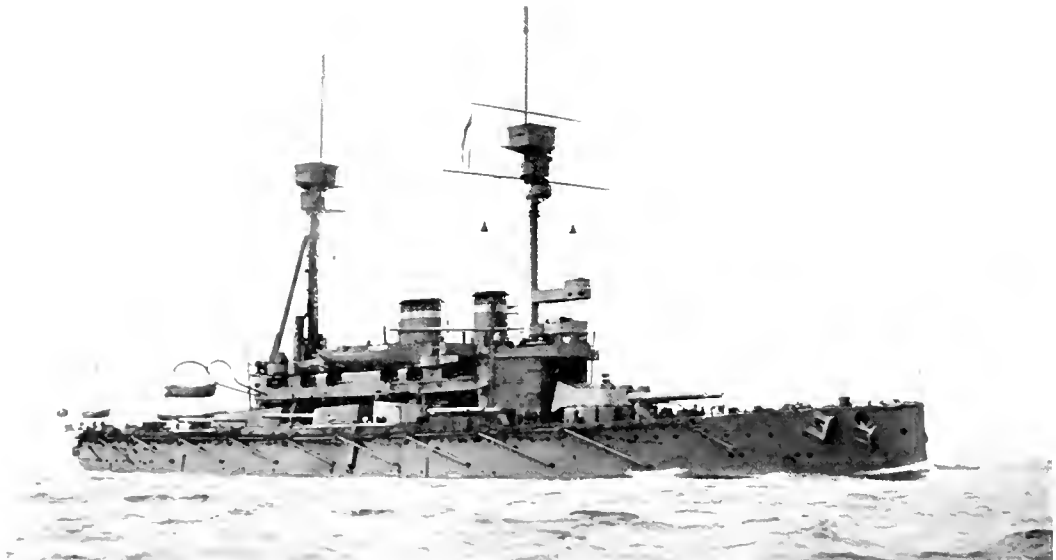
Finally I have to thank Messrs. Gieves, Ltd., for the willing help and courtesy they have extended in the matter of the bulk of the photographs reproduced ; without their assistance the book could never have been so fully illustrated as has now been found possible. To the Publishers I am, as always, grateful for a kindly tolerance towards my importunities in the matter of alterations and additions due to the transient nature of the naval situation, and delay occasioned by the demands of my professional work.

OSCAR PARKES.

The Savage Club,
London, W.C.



JUPITER ("*Majestic*" class).



Lord Nelson

BATTLESHIPS

DEVELOPMENT OF DESIGN FROM THE "MAJESTIC" (1895) TO THE "ORION" (1909)

Whatever prospect the future may hold for the development of the Capital Ship, it is tolerably certain that no period will ever equal the **"Dreadnought"** era for rapidity of evolution. After the paresis which marked the White era 1895—1901 when the apparent perfection of the basic **"Majestic"** (1895) design led to the production of similar ships for the following nine years, a breakaway from the traditional armament of four 12-inch and twelve 6-inch guns was made in the **"King Edward VII"**—the last of Sir William White's battleships. So far as evolution was concerned, however, she might just as well have followed the **"Majestic,"** as the differences between that ship and the **"Queen"** (1901) were relatively slight. But the absence of any competitive designs abroad which might have forced the Admiralty to discard what was undoubtedly an excellent type of battleship, led to the **"Canopus"** (1897), **"Formidable"** (1898), **"Russell"** (1899), and **"Queen"** (1901) classes being but slight variations of the **"Majestic"** design. There was no special reason why the hands of the clock should be put forward deliberately, and consequently even if the question of larger ships had been mooted, the construction of the two **"Queens"** which completed the tactical group of eight **"Formidables"** was justified.

The **"King Edwards"** (1902) were practically **"Formidables"** with the upper deck 6-inch guns replaced by 9.2-inch, and with them the tide of big ship competition abroad started to flow. Under the aegis of Sir Philip Watts and Lord Fisher, there was none of the "wait and see" policy of former years. Contemporary foreign ships were countered by the **"Lord Nelsons"** (1904)—wonderful ships in every way. On a nominal displacement which exceeded that of the **"King Edward VII"** by a few hundred tons only, they mounted six additional 9.2-inch guns (ten in all) on the upper deck instead of ten 6-inch a deck lower which could not be fought in a sea-way. In them was none of the beauty of the traditional British battleship, and their serried piled-up mass and row of turrets presented a picture of grim fighting efficiency which has never been equalled.

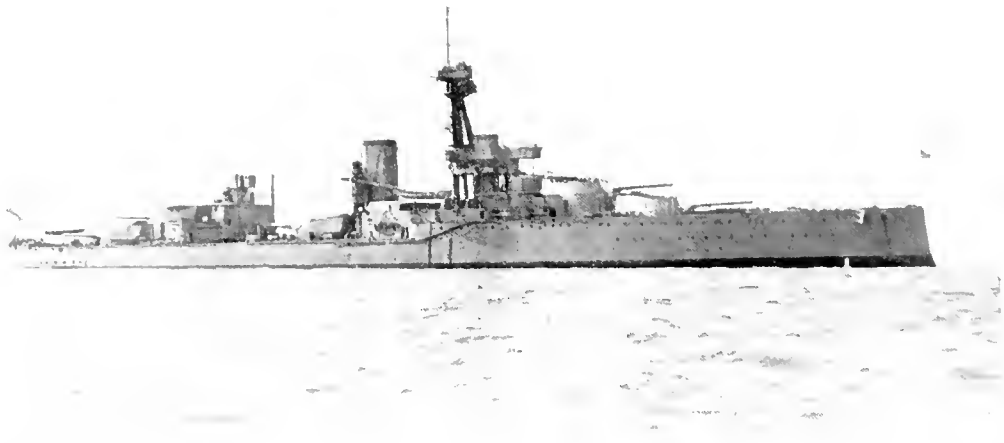
But the **"Dreadnought"** (1905)—that wonder creation which heralded the great world-wide race in armaments—stole their thunder both literally and metaphorically. For the **"Nelson's"** 12-inch guns were appropriated in order that the first "All-big-gun" ship might be completed in the record time of twelve months, and it was over a year after the **"Dreadnought"** had made her debut in 1906 that the belated **"Lord Nelson"** and **"Agamemnon"** joined the Home Fleet unhonoured and unsung.

Everything that can be said about the **" Dreadnought "** has been written and re-written scores of times, and her details are too well known to need more than passing reference. In these days it seems strange that the all-centre-line arrangement was not adopted for her five twin 12-inch turrets, and that 12-pounders should have been considered as an adequate anti-destroyer protection ; but the wing and centre-line positions finally adopted after very careful deliberation were certainly far better than those chosen in later German and Japanese designs, and it must be remembered that destroyers had not then grown to the proportions or torpedoes attained the range which they did subsequently.

As it was, she served as a model for the succeeding **" Bellerophon "** (1906) and **" St. Vincent "** (1907) classes, which were of increased displacement, had smaller secondary batteries of 4-inch guns, a different rig, and various modifications in protection and coal supply.

In order to achieve a full broadside with ten guns, the **" Dreadnought "** arrangement of wing and centre-line turrets was re-cast in the next trio (Neptune, Colossus, and Hercules, 1909), and the wing turrets instead of being placed athwartships with intervening superstructure, were disposed en echelon so that each pair of guns could be brought to bear over a restricted arc on the opposite beam. This arrangement is a time-honoured means of securing a nominal all-round fire at the expense of a general dislocation of internal economy and actual efficiency, having been tried in the **" Inflexible," " Ajax,"** and **" Colossus "** classes during the 'eighties, and subsequently abandoned. In practice the off-side guns were found to set up too much strain in cross-deck firing, and dead ahead or astern fire was precluded by the blast effects to both the ships structure and personnel. In addition the fourth turret in the Neptune was raised to fire over the fifth instead of being on the same level ; an arrangement conducive to economy of space as well as ensuring an increased astern fire, and one which had been advocated by Lord Fisher in 1904 when the original Dreadnought designs were first discussed. Although this was rejected for various reasons at the time, its undoubted superiority over other gun dispositions led to its being finally adopted for the **" Orions "** (1909) and all subsequent classes, reaching its apotheosis in the **" Agincourt "** (taken over from Turkey in 1914) in which seven turrets were mounted along the centre-line. During the last two years all the 12-inch gunned battleships have been relegated to the scrap heap and the Washington Treaty has led to the scrapping of three **" Orions "** and the **" Erin "** which carried the 13.5-inch piece, so that the oldest of the present-day battleships is the last of the **" Orion "** class, the **THUNDERER**, and with her the detailed description of our capital ships commences.

DREADNOUGHT.



THUNDERER.

"ORION" class (1 ship), 1909 Estimates

THUNDERER

As great an advance in gun power and design was made in the **"Orion"** as in the original **"Dreadnought."** The adoption of the 13.5-inch gun—the existence of which had been an open secret for a considerable time although always referred to as the "12-inch A" gun—and the placing of the five turrets along the centre line gave her a total broadside of 12,500 lbs. against the 6,800 lbs. of the **"Dreadnought."** In addition, the armour over the hull was increased in area and thickness and she was given a slightly wider radius of action compared with the **"Neptune."**

The weak points in the design were (1) the retention of the 4-inch gun for the secondary armament and (2) the placing of the mast abaft the fore funnel where the control and director tops were liable to be smoked out—faults which were remedied in subsequent classes.

Dimensions.—581 × 88½ × 30¾ feet = 22,500 tons nominal, and 25,000 tons full load displacement.

Armament.—Ten 13.5-inch guns (firing a 1,250 lb. shell) in five turrets; secondary battery originally sixteen 4-inch guns, now reduced to thirteen; two A.A. and nine smaller guns; two broadside submerged, 21-inch tubes (the stern tube was removed during the War). These were the first battleships to carry the 21-inch instead of the 18-inch tube.

Machinery.—Turbines of 27,000 H.P. driving four screws = 21 knots. 18 boilers. Maximum fuel supply 3,300 tons coal and 800 tons oil.

Protection.—Waterline belt complete except for extreme bow and stern varies from 12 inches amidships to 4 inches at the ends; upper belt between the turrets 9-8 inch. Big gun positions 11-7 inch; secondary guns behind thin shields only. Horizontal armour totals 6½ inches. Screens between the funnels protect the boats.

The **"THUNDERER"** was built by the Thames Ironworks Co. April 1910—June 1912—the last warship to be there constructed—and was one of the first ships to be fitted with experimental "director" firing. Served in the Home Fleet until 1914; Grand Fleet 2nd. B.S. 1914-19 (Jutland). Now sea-going Training ship for Cadets.

Three other ships of the class **CONQUEROR, ORION** and **MONARCH** have been disposed of under the Washington Treaty.

" KING GEORGE V " (3 ships), 1910 Estimates

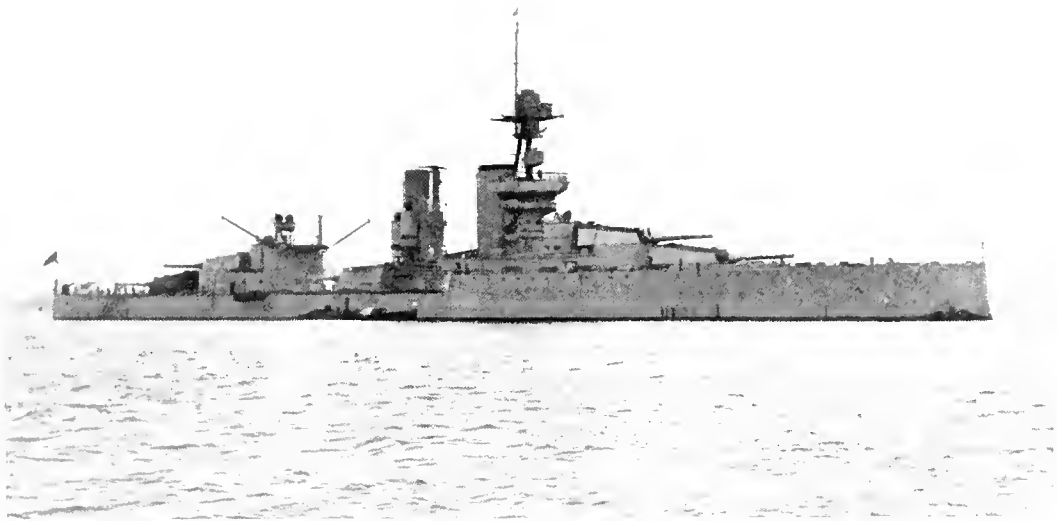
AJAX, CENTURION, KING GEORGE V

In general design these ships are slightly enlarged **" Orions "** with the tripod forward of the funnels, and some re-arrangement of the secondary battery. In order to reduce top weight the **" King George V "** and **" Centurion "** were only fitted with a pole mast when first completed, but this was found to be too " whippy " during gun-fire for range-control purposes, and attempts were made to secure rigidity without resorting to the heavy tripods of previous ships. **" King George V "** had wide flanges added, while **" Centurion "** was given short struts—which were fairly successful, and fitted to **" Ajax "** in consequence. The enlarged tops which were subsequently added to **" King George V's "** mast, however, demanded additional rigidity and this was ultimately secured by giving her a full sized tripod by which she can be differentiated from her sisters.

The dispositions of the secondary battery is worth noting, for whereas in the **" Orions "** the distribution allowed for an equal weight of fire ahead or astern, the concentration is up forward in the **" King George V "** as it was argued that torpedo attack could be expected mainly from ahead. Thus, in addition to the eight guns in the forward superstructure, four more were mounted in the forecastle beneath the turrets firing through lidded ports. These latter, however, were found to be of so little use that they were removed in 1917 and the ports plated up, the secondary battery being reduced to twelve guns.

Dimensions.—$597\frac{3}{4} \times 89 \times 31$ feet = 23,000 tons nominal and 25,000 tons full load displacement.

Armament.—Ten 13.5-inch guns (firing a 1,400 lbs. shell) in five turrets ; secondary battery originally sixteen, now twelve 4-inch guns ; two A.A. and nine smaller pieces. Two submerged broadside 21-inch tubes (stern tube removed during the War).



King George V.

Ajax

" KING GEORGE V "—*continued.*

Machinery.—Turbines of 27,000 H.P. driving four screws = 21 knots. 18 boilers. Maximum fuel supply = 3,150 tons coal and 850 tons oil. Complement 820.

Protection.—Vertical armour as in **" Orion."** The internal protection is more extensive but insufficent, as shown by the loss of the **" Audacious "** after striking a mine; the port engine room was completely flooded and the central one partially so, but she continued to sink slowly for twelve hours, when an internal explosion occurred and she went down.

Appearance.—To distinguish from **" Orions "** note position of mast and derrick stump, also that the fore funnel is the larger of the two. **" King George V "** has high tripods and a torpedo control top half way up mast.

AJAX.—Built by Scotts, Feb., 1911—Oct., 1913. Served in the Home Fleet until 1914; Grand Fleet, 2nd B.S. 1914-19. (Jutland). Mediterranean Fleet 1919 to date; employed in the Black Sea operations.

CENTURION.—Built at Devonport Jan., 1911—Mar., 1913. Sustained a collision during trials and completion delayed. Central search-light controls fitted experimentally in 1913. Served as above. (Jutland and Black Sea operations). Now in Reserve at Malta.

KING GEORGE V.—Built at Portsmouth Jan., 1911—Nov., 1912. Fitted with experimental anti-rolling tanks. Flagship of the Home Fleet until 1914. Flagship 2nd B.S. 1914-19. (Jutland). Mediterranean Fleet 1919 to date.

BATTLESHIPS.

"IRON DUKE" class (4 ships), 1911 Estimates

BENBOW, EMPEROR OF INDIA, IRON DUKE, MARLBOROUGH

These ships are practically **"King George V's"** with an armoured 6-inch battery along the forecastle deck instead of 4-inch guns in the superstructures, an augmented torpedo armament, and a radius of action of 7,780 instead of 6,280 miles—modifications which led to the addition of some 2,000 tons to the nominal displacement. In other respects they closely resemble their prototypes. With regard to the reinstatement of the 6-inch gun, it is worth noting that nothing smaller than the 4.7-inch had been mounted in any foreign dreadnoughts, and our reversion to the larger gun came as a belated admission that the 4-inch was too small for effective use against destroyers which had by this time grown in size very considerably. As at first completed two 6-inch were carried right aft on the main deck, but these were found to be unworkable except in fine weather and therefore removed to the forward shelter deck where they have a high command and a wide arc of fire.

Dimensions.—$622\frac{3}{4} \times 89\frac{1}{2} \times 32\frac{3}{4}$ feet = 25,000 tons nominal and 28,800 tons full load displacement.

Armament.—Ten 13.5-inch guns in five turrets; twelve 6-inch guns in a battery forward; two A.A. and nine smaller pieces. Four submerged tubes.

Machinery.—Turbines of 29,000 H.P. = 21 knots. 18 boilers. Fuel supply 3,250 tons coal and 1,600 tons oil. Complement 995/1022.

Iron Duke.

Emperor of India.

" IRON DUKE " class (*continued*).

Protection.—As in **" King George V "** excepting that the 12-inch water line belt is shallower and a portion of the continuation forward is increased from 4 to 6 inches. Internal protection is better, and as in the preceding classes, was augmented after Jutland.

Appearance.—Distinguished from the **" King George V "** by (1) funnels which are round and narrower, and (2) recessed forecastle with battery guns. While serving in the Mediterranean they were given stump main masts with a search-light platform and top mast.

BENBOW.—Built by Beardmore, May 1912—Oct., 1914. Joined the Grand Fleet 1914 and served in 2nd B.S. until 1919 : Flagship of the 2nd B.S. at Jutland : Mediterranean 1919 to date, and employed in the Black Sea operations.

EMPEROR OF INDIA.—(originally known as **" Delhi "**). Built by Vickers, May 1912—Nov., 1914. Grand Fleet 1914-19 and for some time flagship of the 1st B.S. : Mediterranean 1919-1922. Now paid off for re-fit at Devonport.

IRON DUKE.—Built at Portsmouth, Jan., 1912—Mar., 1914. Flagship of the Home Fleet 1914, and of C. in C. Grand Fleet 1914-16 : (Jutland) : Served in 2nd B.S. 1916-19 : Mediterranean Fleet (flagship) 1919 to date. Employed in Black Sea operations.

MARLBOROUGH.—Built at Devonport, Jan., 1912—June 1914. Served in Home Fleet until War. Grand Fleet 1st B.S. (flagship 1914) 1914-19. Torpedoed and severely damaged at Jutland : Mediterranean Fleet 1919 to date. Employed in Black Sea operations.

"QUEEN ELIZABETH" class (5 ships), 1912 Estimates

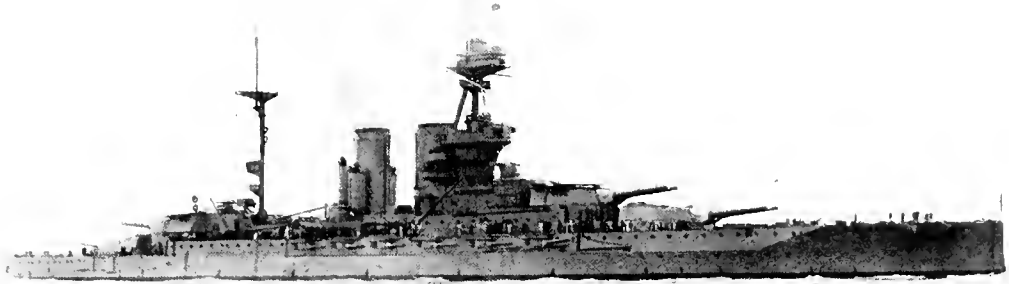
BARHAM, MALAYA, QUEEN ELIZABETH, VALIANT, WARSPITE

The finest group of fighting ships afloat and one of the best all-round designs ever produced. In some outward characteristics they may resemble the **"Iron Dukes,"** but that is as far as the semblance goes—in every other respect they are as great an advance over preceding types as were the **"Dreadnought"** and **"Orion."** Briefly, they are battleships with almost the speed of a battle-cruiser; not a compromise deficient in protection, as were the battle-cruisers, but the real "fast battleship" in which speed was obtained without any undue sacrifice of military qualities. The success of the design lies in two great innovations: (1) the 15-inch gun and (2) oil fuel only. It was decided to equip the class with the new 15-inch weapon before even the proving ground trials had been carried out, so confident were the Admiralty in its success. Increased gunpower was necessitated by the adoption of the 14-inch gun by Japan and America, and although 14-inch guns were being built in this country it was decided to go one better and assure our superiority in this respect for some years ahead.

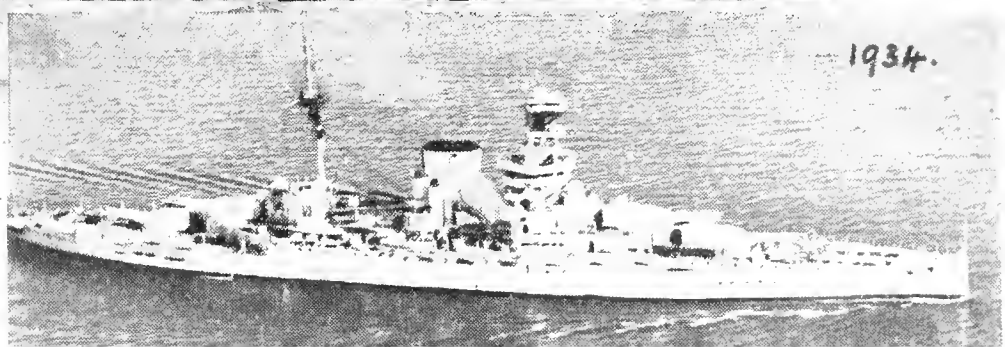
Oil fuel means greater economy in weight and space, plus increased efficiency, and if mixed fuel had been carried it is doubtful if more than 22 knots could have been attained; as it was the additional engine-room space required for the great increase in horse-power eliminated the amidships turret, these ships carrying eight 15-inch guns only. At Jutland four of the class were used as battle-cruisers, and without their help the course of the action might have been very different.

As in the **"Iron Dukes,"** there is a battery of 6-inch guns along the forecastle deck, and originally the Queen Elizabeths carried four more on the main deck aft, making sixteen in all. These latter, however, were found to be useless and were removed, being for a time replaced by a single gun on the upper deck amidships on either side; this was taken out from all five ships about 1916 and A.A. guns substituted. Owing to the way the hull side is recessed and the three foremost guns are stepped to secure ahead fire, the battery has proved to be very wet in a seaway, and before steps were taken to make the ports water-tight, the forecastle deck was frequently flooded out; as it is the guns are difficult to fight in moderate weather, and in the **"Revenge"** class, which followed, the whole battery was moved further aft so as to be clear of the broken water forward.

1915-18.

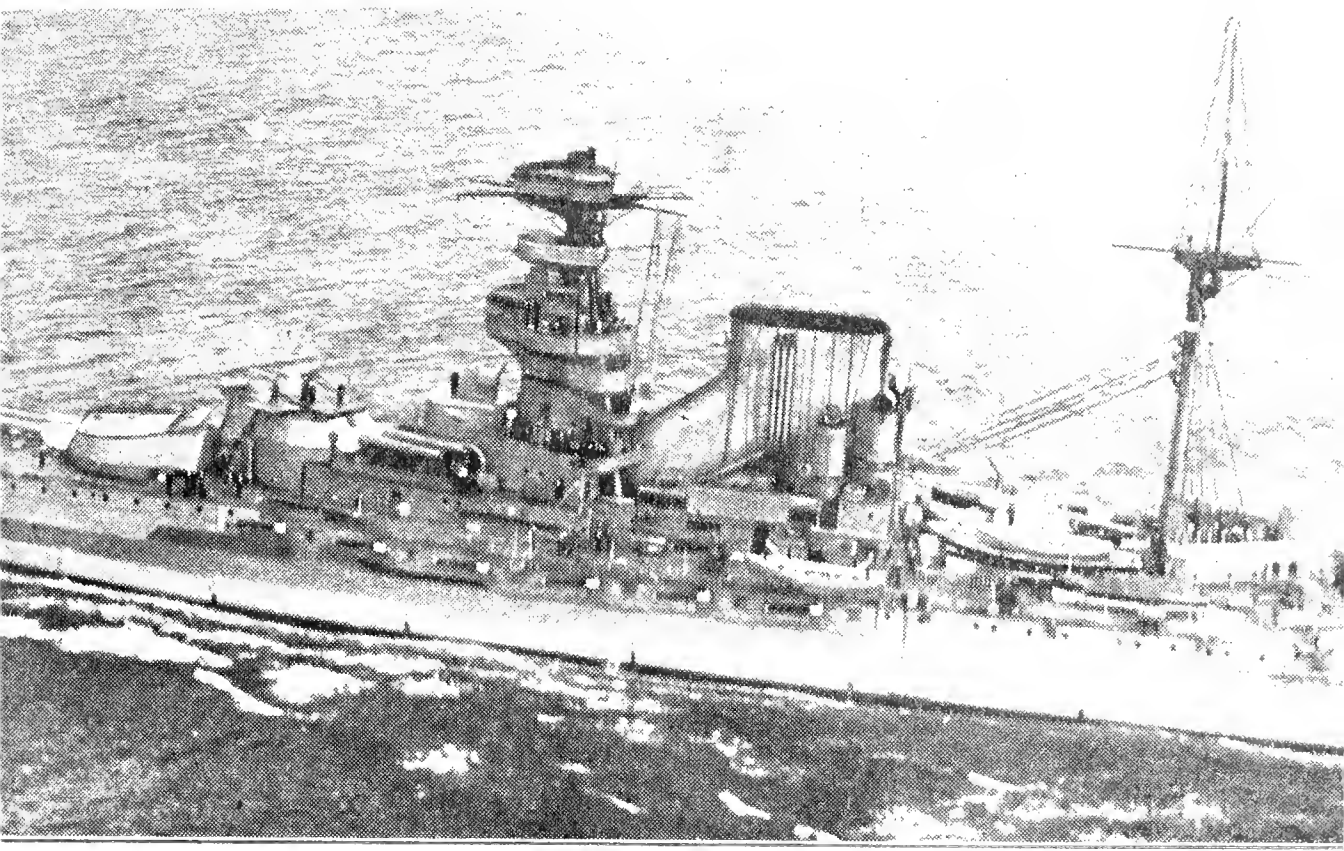


1934.



QUEEN ELIZABETH.

Malaya.



Warspite, one of the capital ships of the Red Fleet, photographed from an attacking seaplane.

Note- alterations to funnels

ELFAST.

THLONE.

record of dance music. 12.30-12.0—Jack Jackson and his Band, relayed from the Dorchester Hotel. Time Signal from Greenwich at 11.30.)

FAMILIES LEAVE HOMES IN GLASGOW FIRE

Families residing in a tenement in Pleasance Lane, Pollokshaws, Glasgow, left their homes as a precautionary measure on Saturday night when fire broke out in a nearby kipper-ing store. Flames were seen breaking through the roof of the store shortly before eleven o'clock, and when it appeared that the fire might spread Mr and Mrs William Blain, who stay in the tenement, roused their six children and carried them into the street for safety, while Mrs Rose Sweeney (75), who lives alone in an attic, was wakened by her nephew and carried downstairs. Detachments from the Central and Southern Divisions of the Fire Brigade prevented the outbreak from spreading, however, and within an hour the families were able to return to their homes. The upper part of the store was destroyed, the loss being estimated to amount to £300.

and his son was motor racing at Monte Carlo.

Waspish Stings of Curiosity

There is the house, too, the Q's lived in a jolly house, but they didn't get on together. He left her in the end. There is the Princes house, the most convenient house on earth but even as you enter you feel as though the air were alive with the waspish stings

GLASGOW HOUSING

PROPERTY OWNERS AND THE FIVE-YEAR PLAN

OBJECTION TO FURTHER BUILDING

The five-year plan of housing development which has been submitted by the Director of Housing in Glasgow to the Corporation Housing Committee is one that arouses the hostility of the Property Owners' and Factors' Association in so far as it proposes the erection of more intermediate houses designed to abate overcrowding conditions. The slum-clearance part of the scheme, on the other hand, evokes every sympathy from the Association.

RENT ACT REACTION.

Mr R. Murray MacGregor, the interim secretary of the Association, discussed the plan from the property owner's point of view in an interview, in which he claimed

BATTLESHIPS.

"QUEEN ELIZABETH" class (*continued*).

Dimensions.—644 × 90½ × 33½ feet = 27,500 tons nominal and about 33,000 tons full load displacement.

Armament.—Eight 15-inch guns in four turrets; twelve 6-inch; two A.A. and five smaller pieces. Four submerged 21-inch tubes (broadside).

Machinery.—Turbines of 75,000 H.P. = 25 knots. Oil fuel = 3,400 tons. 24 large tube boilers. Complement, 1,220/1,260.

Protection.—Waterline belt 13 inches amidships, tapering to 6 inches and 4 inches. Upper belt between turrets and battery is 6 inches. Big gun positions 11—7 inch. The internal protection is very strong and complete. A weak point is the absence of screens between the 6-inch guns, which accounted for the casualties in **"Malaya"** at Jutland.

Appearance.—Easily recognisable by the pole mainmast and two enormous funnels. **"Barham"** alone carries a search-light top halfway up the tripod.

BARHAM.—Built at Clydebank, Feb., 1913—Oct., 1915. Grand Fleet Flagship, 5th B.S., 1915–19 (Jutland). Flagship 1st B.S. Atlantic Fleet, 1919 to date.

MALAYA.—Built by Elswick, Oct., 1913—Feb., 1916. Gift of the Federated Malay States. Served as above. Sustained heavy casualties at Jutland. Conveyed the Duke of Connaught to the Malay States, 1921.

QUEEN ELIZABETH.—Built at Portsmouth, Oct., 1912—Jan., 1915. Present at the bombardment of the Dardanelles forts, 1915, where she was employed on long-range indirect firing. Served in the Grand Fleet 4th and 5th B.S. until 1916, when she became flagship of the C.-in-C. until 1919. Fleet Flagship of the Atlantic Fleet, 1919 to date.

VALIANT.—Built at Fairfield, Jan., 1913—Feb., 1916. Grand Fleet 5th B.S., 1916–19 (Jutland). Atlantic Fleet 1st B.S., 1919 to date.

WARSPITE.—Built at Devonport, Oct., 1912—Mar., 1915. Grand Fleet 5th B.S. Was considerably damaged at Jutland. Collided with the **"Barham"** in 1915 and with **"Valiant"** Aug., 1916, on both of which occasions she sustained severe damage. Atlantic Fleet 1st B.S., 1919 to date.

"REVENGE" class (5 ships), 1914 Estimates

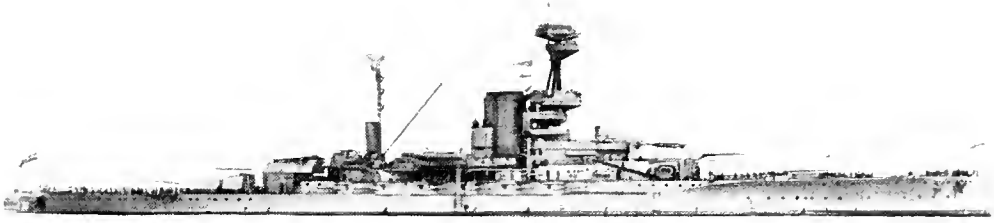
RAMILLIES, RESOLUTION, REVENGE, ROYAL OAK, ROYAL SOVEREIGN

As originally designed these ships were to have been coal-burning editions of the **"Queen Elizabeth"** with a speed of 21 knots. It was at that time anticipated that there might be some difficulty in maintaining the supply of oil fuel during war-time, and rather than risk the activities of the Fleet being curtailed, the loss of about two knots and the attendant disadvantages of coal fuel were accepted as the price of safety. However, on Lord Fisher's initiative their design was modified while they were still on the stocks in 1915, and oil fuel substituted—by which it was hoped the speed would be raised to 23 knots; the highest recorded, however, does not exceed 22 knots. **"Ramillies," "Revenge"** and **"Resolution"** are fitted with modified "bulges" along the water line as anti-torpedo protection and incidentally to diminish their rolling qualities, which in all the class was, and is, rather marked. Unfortunately, the extra beam due to the bulges precludes the addition of bilge keels as such would result in the width of our docking accommodation being exceeded, and consequently the "bulged" ships roll as badly as those not fitted.

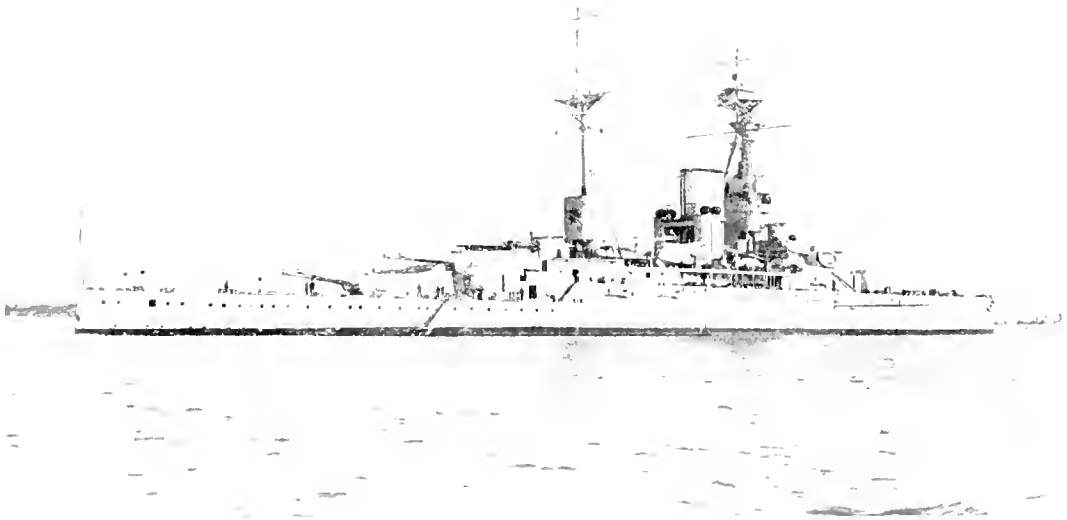
The armament is arranged as in the **"Queen Elizabeth"** but the secondary battery is spaced further aft and there are a couple of extra 6-inch on the upper deck; in addition the armour is arranged somewhat differently and the internal protection is stronger. They are splendid ships in every way, but are not generally rated so highly as the **"Queen Elizabeth"** class on account of their lower speed.

Dimensions.—624¼ × 88½ (with bulges, 101½—102½ feet) × 31 feet = 25,750 tons nominal 31,200 tons full load displacement. With bulges, full load is about 33,500 tons.

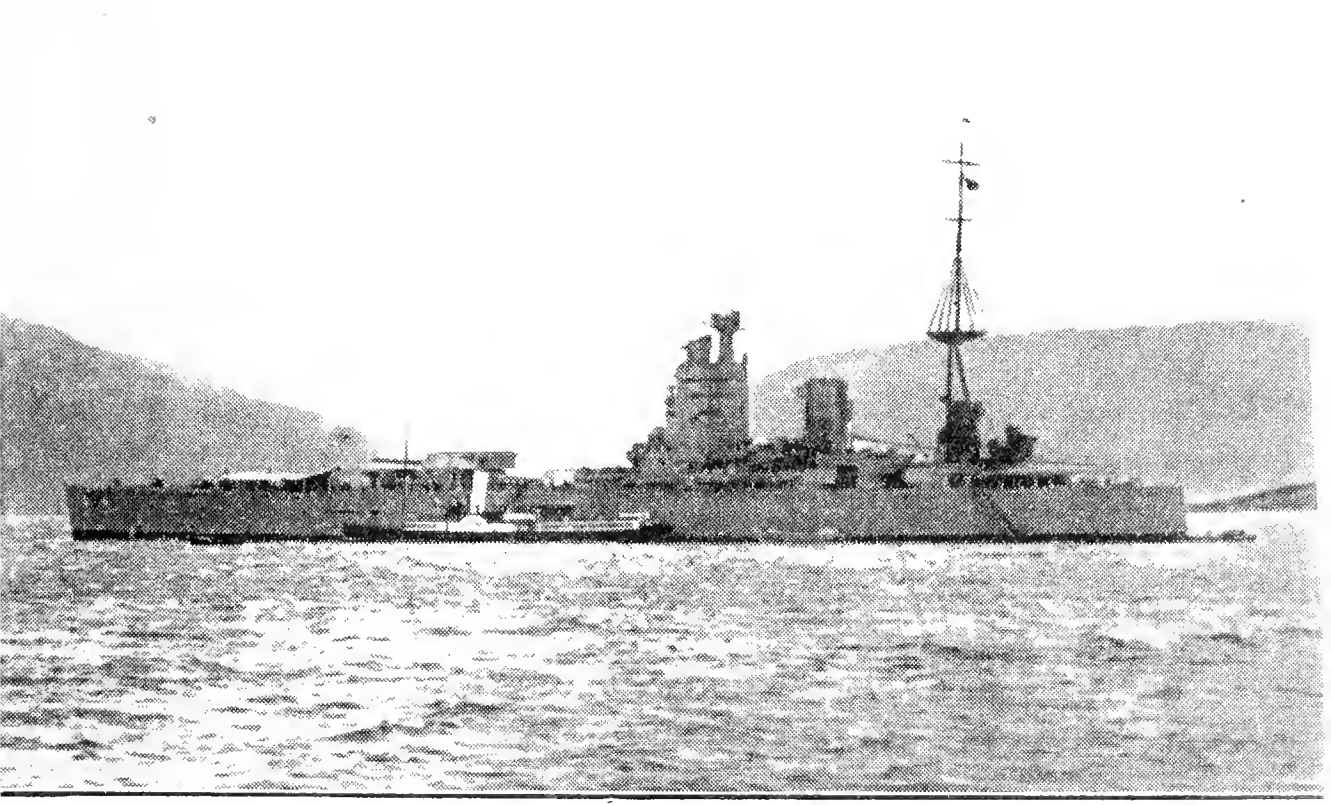
Armament.—Eight 15-inch; fourteen 6-inch; 2 A.A. and nine smaller guns. The arrangement of the 6-inch allows for a better all-round fire than in the **"Queen Elizabeth."** Four submerged 21-inch torpedo tubes.



REVENGE.



Royal Oak.



H.M.S. NELSON photographed off Rothesay. Note the comparative size of the river steamer.

[illegible] two lengths. Winner trained by [illegible] Newmarket.

[illegible] HIGHWEIGHT HANDICAP of 250 sovs. Seven furlongs. [illegible]

[illegible]

PRENTICES' PLATE of 200 sovs. One mile. [illegible]

[illegible]

NOTES FROM THE COURSE.

[illegible]

JULY MEETING ENTRIES

The following are entries for the Ayr July Meeting, to take place on Monday and Tuesday, July 16 and 17:—

FIRST DAY.

MONTROSE HANDICAP PLATE of 500 sovs. Five furlongs.—W. H. Thorpe's Harpagon, 5 yrs; W. H. Thorpe's Mudlark, 6 yrs; H. F. Clayton's Flywheeler, 5 yrs; Mrs D. Gardner's Sea Kale, 5 yrs; J. Tait's Cynus, aged; Lord Glanely's Granacre, 5 yrs; Sir L. Green's Golden Opme, 5 yrs; John Bell's Golden Boy, 5 yrs; G. Tordoff's Evening Rose, 5 yrs; H. Mollekin's Abbot's Luck, 4 yrs; L. Brooks's Assam, 6 yrs; L. Brooks's Glamour, 3 yrs; A. Hood's Devastation, 5 yrs; Sir E. W. Tait's Ulinette, 4 yrs; Sir E. W. Tait's Maecenas, 6 yrs; Capt. S. Wilson's Touring Prince, 4 yrs; Sir L. Green's Nunnery Lane, 4 yrs; J. R. Renwick's Nil Smile, 5 yrs; W. J. Peck's Pheasee, 4 yrs; Major J. A. Coats's Il Sorriso de Sabato, 4 yrs; R. Lumsden's Lady Marcus, 6 yrs; W. W. Hope's Fire Engine, 4 yrs; W. W. Hope's Brushwood, 3 yrs; H. R. Broughton's Lord Walter, 5 yrs; Lord Dewar's Slipper's Slip, 3 yrs; G. S. Whitelaw's Enzo, 6 yrs; L. Oppenheim's Cross April, 6 yrs.

EGLINTON STAKES, with 200 sovs. added. One mile and five furlongs.—Lord Marton's Squabbler, 5 yrs; C. Castle's Gallipoli Hope, 6 yrs; F. Barling's Light Dragoon, aged; John Johnstone's Illustration, 5 yrs; John Johnstone's Kingsdown, 6 yrs; Colonel T. C. Dunlop's Fabulist, 5 yrs; G. Gunter's Camp News, 3 yrs; James Cairns' Condar, aged; J. E. Anderton's Regal Mixture, 4 yrs; J. E. Anderton's Searchlight, 4 yrs; R. Renton's Perfect, 5 yrs; R. Renton's Ithuna, aged; Brig.-Gen. Bruton's Manaos, 5 yrs; Captain S. Wilson's Spey Royal, 3 yrs; J. G. Thompson's Primrose League, 5 yrs; Lord Brumby's Pilate, 5 yrs; G. P. Sanday's Royal Falloch, 6 yrs; G. Barclay's Sweet Planet, 5 yrs; Sir L. Green's Arcturus, aged; Lord Harewood's Burwarton, 4 yrs; H. G. Blagrave's Royal Miller, 5 yrs; E. C. Parker's Hill Sun, 4 yrs; R. T. Waugh's Blackhead, 3 yrs; Mrs J. A. Watson's Martyr, 4 yrs; F. Wright's Joyous Greeting, 4 yrs; J. Templeman's Lights o' London, 6 yrs; Captain Whitworth's Whelblake, 5 yrs.

STAND MAIDEN PLATE, of 200 sovs. One mile and a quarter.—Mrs H. Gardner's Amicus, 3 yrs; H. F. Clayton's Dreadnought, 3 yrs; Sir J. Hanmer's Blackrod, 3 yrs; G. Crabtree's Phaeton Jim, 3 yrs; Mrs L. M. Bennett's Carlonte, 3 yrs; Captain S. Wilson's Condamine, 3 yrs; J. A. Campbell's Spanish Pearl, 3 yrs; Joseph Benson's West Coast, 3 yrs; Sir G. Renwick's Prince Attention, 3 yrs; R. Lumsden's Short [illegible]; R. Lumsden's Perfect Lady, 4 yrs; R. Campbell's [illegible]; Major J. A. Coats' Switch [illegible]; Captain Whitworth's Jenny Firkin, [illegible]; H. Mollekin's Not a [illegible]

LADIES' SINGLES.

First Round.

Miss A. I. Walker, Larbert, beat Miss N. [illegible] Livilands—6-2, 6-0. Mrs W. Allison, Ochilv[iew] [illegible] Miss M. F. Fergusen, Ochilview—6-2, 6-1.

Second Round.

Miss B. H. Walker, Larbert, beat Miss E. [illegible] Livilands—6-0, 6-2; Miss A. Y. Morton, [illegible] Allan, beat Mrs Lees, Bridge of Allan—6-1, [illegible]

GENTLEMEN'S DOUBLES.

First Round.

G. S. Barras, Livilands, beat J. Buchan, [illegible] 6-3, 6-4

Second Round.

J. S. Reynolds, Livilands, beat J. P. Watt, [illegible] 6-1, 6-4.

MIXED DOUBLES.

First Round.

J. R. Walker and Miss A. I. Walker, [illegible] (holders), beat J. A. Balfour and Miss B. C. [illegible] Grangemouth—6-3, 6-0. R. W. Blakey and [illegible] H. Walker, Larbert, beat W. M. Duff and M[iss] [illegible] Collier, Callander—6-4, 8-6.

LADIES' DOUBLES.

First Round.

Misses D. Fleming and M. Reid, Falkirk, [illegible] R. Common and Miss I. G. M'Clees, Livila[nds] [illegible] 6-2, Misses M. O. G. Liddell and J. E. Weir [illegible] beat Mrs A. J. Fleming and Mrs D. I. [illegible] Stirling—7-5, 6-4; Miss A. E. Middleton, [illegible] and Mrs Fairlie, Larbert, beat Mrs G. [illegible] Miller and Mrs F. G. Buchanan, Stirling—6[illegible]

GENTLEMEN'S DOUBLES.

First Round.

A. C. Muir, Livilands, and A. B. Learmon[th] [illegible] view, beat A. N. Lewis and A. Donaldson [illegible] 3-6, 6-1, 10-8; L. C. Middleton and J. [illegible] Livilands, beat N. W. Mowbray, Stirling, a[nd] [illegible] Mitchell, unattached—6-2, 6-2.

BECKENHAM INTERNATIO[NAL] MEETING

W. A. R. COLLINS BEATEN

Rain seriously interfered with play in [illegible] Championships at Beckenham yesterday, bu[t] [illegible] events were well advanced. In the third ro[und] [illegible] were some interesting international matches [illegible] the men's event D. M. Greig, the holder, scor[ed] [illegible] easy victory to reach the penultimate stage.

Two of the three players who passed into [the] [illegible] final round of the Ladies' Singles Champio[nship] [illegible] Australians, while the American holder of [illegible]

" REVENGE " (*continued*).

Machinery.—Turbines of 40,000 H.P. = 22 knots (with bulges). 18 boilers. 4 screws. Oil fue maximum = 3,400/4,000 tons. Complement 1,170/1,200.

Protection.—Generally as in the **" Queen Elizabeth "** excepting that the turrets are 13 inches, the 6 inches armour is distributed more amidships along the upper deck, and the area covered by 13 inches along the water line is greater.

Appearance.—Owing to the fewer boilers these ships have only one funnel, by which they are easily differentiated from the **" Queen Elizabeth."**

RAMILLIES.—Built by Beardmore, Nov., 1913—1916. Injured herself at launch and with great difficulty was towed to Liverpool and repaired by Cammell Laird, Sept., 1917. Served in the Grand Fleet 1917—19; 1st B.S. and Atlantic Fleet 1st B.S. to date. In action off Ismid and Rodosto 1920, during operations against the Turks.

RESOLUTION.—Built by Palmers, Nov., 1913—Dec., 1916. Grand Fleet 1st B.S. 1916-19 and Atlantic Fleet 1st B.S. to date.

REVENGE.—Built by Vickers, (first named **" Renown "**) Dec. 1913—Mar., 1916. Grand Fleet 1st B.S., 1916-19 (Flagship Second in Command). Jutland. Atlantic Fleet 1st B.S. (flag) 1919 to date.

ROYAL OAK.—Built at Devonport, Jan., 1914—May, 1916. Served as **" Resolution "** (Jutland).

ROYAL SOVEREIGN.—Built at Portsmouth, Jan., 1914—May, 1916. Served as **" Resolution."** During the last year has undergone an extensive refit at Portsmouth, when bulges were fitted.

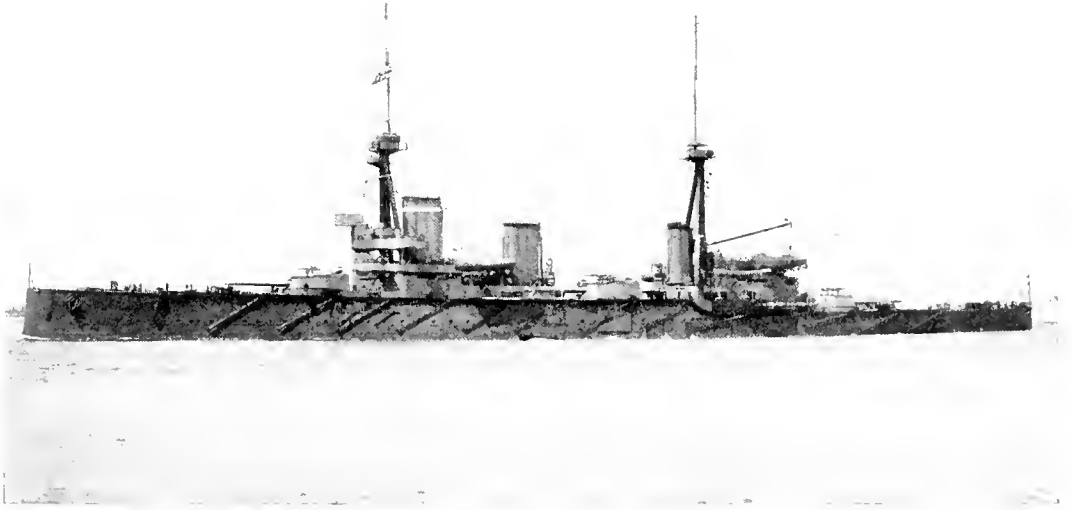
DEVELOPMENT OF THE BATTLE-CRUISER

The term **" Battle-cruisers "** was coined in 1911 for the all-big-gun armoured cruisers—or **" Dreadnought cruisers "** as they were more latterly called—of the **" Invincible," " Indefatigable,"** and **" Lion "** classes. These ships are hybrids which are best described as " Armoured cruisers with a battleship's armament " and were originally intended as re-inforcements for the cruiser squadrons—the role they acted at the Falkland Isles—rather than units of a fast battle squadron as at Jutland. The first trio **" Invincible " " Inflexible,"** and **" Indomitable "** which were completed in 1907 were armed with eight 12-inch guns, had 6-inch—4-inch belts, and a designed speed of 25 knots with 41,000 H.P. By placing the two amidships turrets en echelon they had, on paper, the same broadside as the **" Dreadnought,"** but actually the cross-deck arcs of fire of the off-side guns were very limited. It was originally intended to give them a secondary battery of 12-pounders like the **" Dreadnought,"** but as they were not completed until nearly two years later when a new model 4-inch gun had come into favour, they were fitted with sixteen of these guns instead.

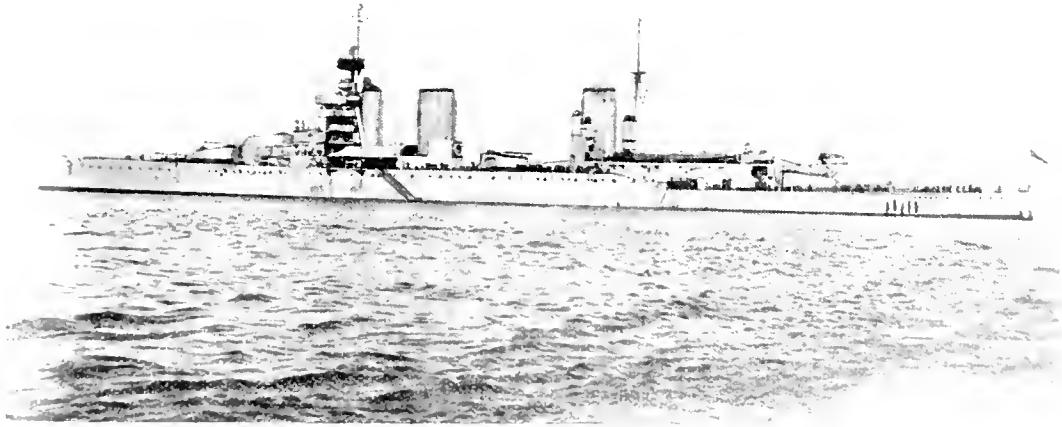
All three greatly exceeded their designed power and speed and made over 28 knots in service ; as armoured cruisers they were admirable although colossal fuel eaters, but when employed in line-of-battle they proved to be too deficient in protection to withstand heavy gun fire—a failing exhibited by all our pre-war battle-cruisers.

The **" Invincible "** was sunk at Jutland, and the other two ships have been stricken from the effective list, so that our oldest ship of this type is now the **" Australia "** of the **" Indefatigable "** class, which is described subsequently.

In general design the **" Indefatigable "** was an enlarged **" Invincible "** with the two amidships turrets widely spaced in order to secure greater arcs of fire on either beam—an arrangement which on paper allowed for an ahead and astern fire of six guns and a broadside of eight. In practice the wing guns would never have been employed on an ahead or astern bearing, or within a considerable number of degrees of the axial line because of blast effects—even a six inch gun cannot be fired within 10 of the middle line for this reason, while cross-deck firing was attendant with considerable strain on the ship's structure. But for all that, the en echelon system as it is called was adopted in our own and in the German Navies for battle-cruisers, although the " All-centre-line " disposition as employed in the U.S. ships was generally recognised as being better, albeit more or less revolutionary for modern ships, and therefore to be watched with an eye to the future.



INFLEXIBLE.



Lion

(continued)

The **" Lion "** class (1909) which followed the **" Indefatigable "** belonged to the same programme as the **" Orion "** and embodies the new features introduced into that ship, i.e. (1) the centre-line disposition of the turrets, and (2) the 13.5-inch gun. They were great improvements on the **" Australia "** in every way, being faster, better armed and protected, and superior sea boats. The four turrets were disposed two forward, one amidships between the funnels, and one aft—a not altogether happy arrangement which was modified in the later **" Tiger."** The secondary battery of sixteen 4-inch guns was mounted in the shelter decks fore and aft with a high command and a well-arranged concentration of fire, while two submerged tubes were fitted to discharge the new 21-inch torpedo. Increased protection was given to the water line, hull side and big guns, and a speed of 28 knots was realised by increasing the h.p. from 44,000 to 70,000.

As originally designed the **" Lions "** had a big tripod mast immediately behind the fore funnel, which was close up against the bridge as in the **" Dreadnought," " Colossus "** and **" Orion "** classes—a most unhappy arrangement which led to the control tops being rendered uninhabitable when at full speed—or less with a following wind—owing to the smoke and exhaust gasses from the funnel. In the case of the **" Lion "** the terrific heat resulting when her 70,000 horse power was developed caused the control top to be practically burnt out, and navigation became almost impossible as the bridge instruments were affected by the heat. All three ships had to undergo drastic alterations in consequence. The fore funnel was shifted further aft and a pole mast replaced the tripod and was stepped immediately behind the bridge ; the heavy tripod was discarded as at this period the " director " scheme of firing was not in favour, and a light observation top was all that was considered necessary. After the battle of Dogger Bank " director " firing was installed, and the masts were stiffened by means of struts so that in the end they were of the light tripod variety.

Both the **" Lion "** and **" Princess Royal "** saw exceptional war service, the former being badly injured both at the Dogger Bank and Jutland battles ; they have now been relegated to the disposal list under the Washington Treaty.

The "AUSTRALIA," 1910—1912

Built to the order of the Australian Government, this ship is a sister to the **"Indefatigable"** which was sunk at Jutland, and a battle-cruiser edition of the **"Neptune."** The general design is a modified **"Invincible"** with the amidships turrets further apart and firing through a wider arc of fire on the opposite beam. Owing to the spacing of the turrets and distribution of the boiler rooms in consequence, she is rather cramped internally. Although some 23 feet longer than the **"Invincible"** the **"Australia"** has a shorter forecastle and quarter deck, and generally looks very much bigger than her predecessors; in service she proved to be a better sea-boat and usually faster.

Dimensions.—590 × 80 × 30 feet = 18,800 tons normal and 20,000 tons full load displacement.

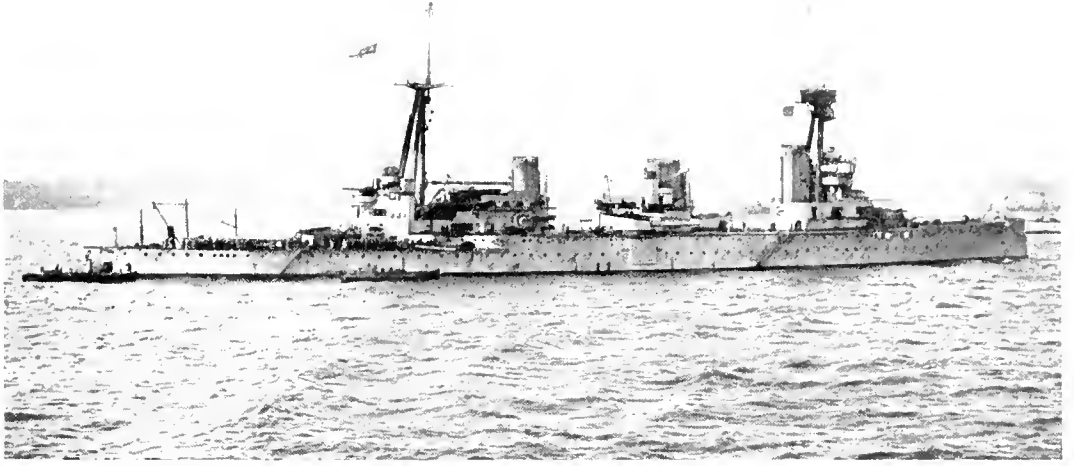
Armament.—Eight 12-inch guns in four turrets; ten (originally sixteen) 4-inch guns in small casemates in the shelter decks; one A.A. and nine smaller pieces. Two 18-inch broadside submerged torpedo tubes.

Machinery.—Turbines of 44,000 H.P. driving 4 screws = 25 knots. On trials all out she reached over 28 knots, but cannot touch this now. Coal = 3,170 tons, plus 840 tons oil.

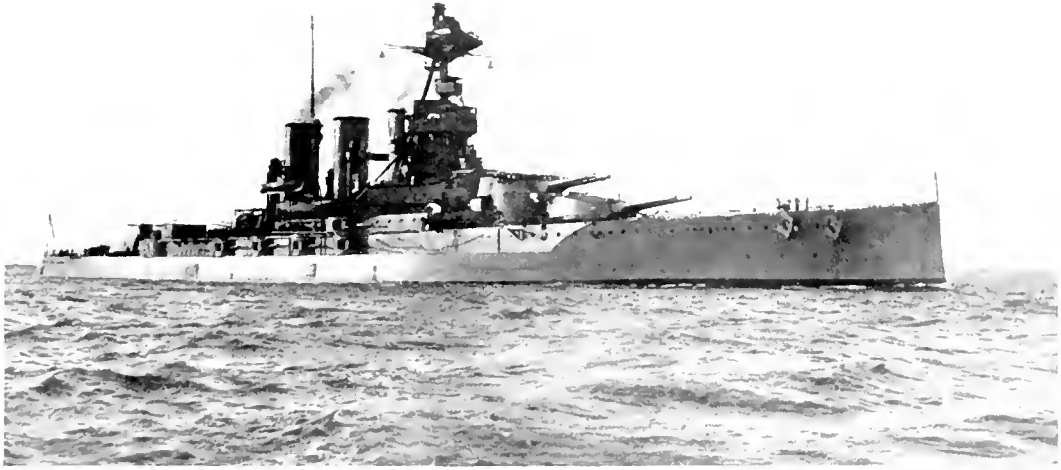
Protection.—The side armour consists of a water line belt only, which is 6 inches thick amidships and 5—4 inches at the ends, extending to about 50 feet short of the bow and stern. Big guns 7 inch. Horizontal protection totals about 3 inches. The absence of adequate side and deck armour led to the loss of the **"Indefatigable"** and the **"Australia"** cannot be regarded as fit for service excepting as an armoured cruiser.

Appearance.—The arrangement of the masts and funnels is absolutely unique and she cannot be mistaken for any other warship afloat.

The **AUSTRALIA** was built at Clydebank, 1910—13. Flagship of the R.A.N. 1913 to 1914 and was then employed on detached service until she joined the Grand Fleet in Feb., 1915 as flagship of the 2nd B.C.S., in which she served until 1919. Damaged in collision with the **"New Zealand"** during a thick fog, April, 1916. Returned to Australia in the Spring 1919 and is now in Reserve as a unit of the R.A.N.



Australia.



TIGER.

The "TIGER," 1911 Estimates

Although the **"Tiger"** is nominally the sole representative of her class, she is usually regarded as the fourth of the **"Lions"** with her guns disposed in a more effective way. Although of the same length she has slightly more beam and draught, and correspondingly greater engine power for the same designed speed. By grouping the engine and boiler rooms amidships the third turret is placed further aft and given an uninterrupted arc of fire astern and to within 45 degrees of the bow on each beam—the obvious arrangement which should have been introduced in the **"Lions."** The tardy re-introduction of the 6-inch gun in place of the 4-inch, and the necessity for providing these with adequate armour caused the secondary battery to be disposed mainly along the forecastle deck, but set back sufficiently amidships for them to be clear of the bow wave and not so liable to be washed out as are the secondary guns in the **"Iron Dukes"** and **"Queen Elizabeths."** The remaining couple of 6-inch guns in the **"Tiger"** are in casemates abaft the shelter deck forward, and have a high and wide command.

Dimensions.—704 × 90½ × 34 feet = 28,500 tons nominal and 35,000 tons full load displacement.

Armament.—Eight 13.5-inch guns in four turrets; twelve 6-inch and two 3-inch A.A. guns; nineteen smaller pieces. Four submerged 21-inch torpedo tubes.

Machinery.—Turbines of 85,000 H.P. driving four screws = 28 knots designed speed; she attained 30 knots on trial with 108,000 H.P. Fuel = Oil 3,480 tons, coal 2,800 tons maximum—an enormous capacity—but as she burns some 1,200 tons of fuel a day at 60,000 H.P. her cruising radius is nothing exceptional. Complement 1,450.

Protection.—The belt is 9 inches amidships with 5-inch and 4-inch continuations extending almost to the extremities; between the end turrets, the main deck side is 6—5 inches and the battery above this is 6 inch with a 5-inches prolongation to the foremost turret. The big gun positions are 9—8 inch, and the deck armour totals about 5 inches.

TIGER.—Built at Clydebank, June, 1912—Oct., 1914, she joined the Grand Fleet in Nov., 1914 as a unit of the 1st B.C.S. She was present at the Dogger Bank action and at Jutland where she sustained turret and hull side injuries. Throughout hostilities she remained in the 1st B.C.S. and on the re-organisation of the Fleet joined the B.C.S. Atlantic Fleet. During 1921 she underwent a refit at Devonport and has since been in Reserve at the Nore.

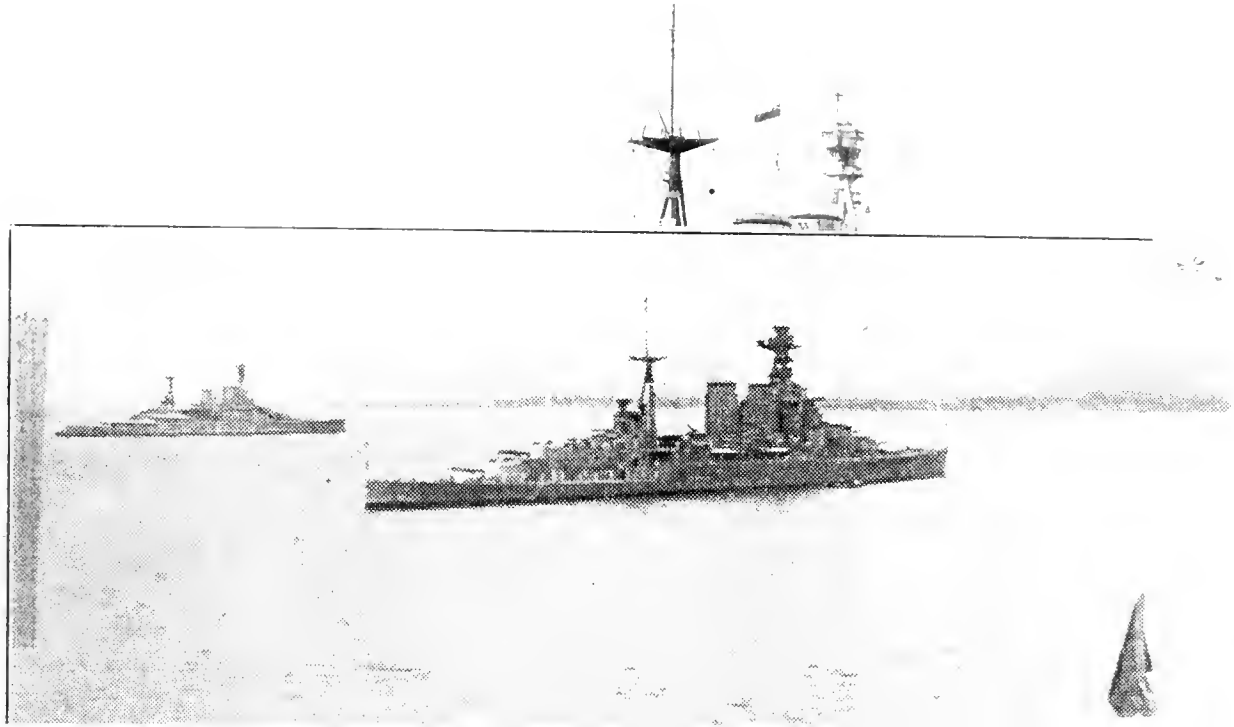
RENOWN, REPULSE

Lord Fisher used to assert that the ideal fighting ship should be armed with the " Biggest possible big gun and the smallest practicable secondary gun " while her defensive qualities should be sacrificed to engine power, as " Speed was the best Protection." The **" Renown "** and **" Repulse "** were built to his specifications in the early days of the War and embody these two doctrines in their design. Originally intended for special operations in the Baltic they are typical war-time productions—hastily conceived, hurriedly built, and radical departures from our recognised line of development. Laid down in 1914 as battleships of the **" Royal Sovereign "** class, their construction as such was held up at an early stage when they were re-designed, cut in half and lengthened by about 170 feet, and completed in twenty months as lightly armoured, shallow-draught very fast battle-cruisers.

Our losses at Jutland having demonstrated the inefficient protection of our existing battle-cruisers, they were regarded very unfavourably when joining the Grand Fleet. Their meagre vertical and horizontal armour—about on a par with that of the **" Invincible "**—was recognised as being quite inadequate for their proper employment, and on Admiral Jellicoe's representations they were at once taken in hand for their decks and magazine protection to be strengthened. Even then their vast unarmoured sides left them exceedingly vulnerable and during 1919-20 the **" Repulse "** underwent a thorough refit when additional belt and main deck armour was fitted and the bulges modified ; **" Renown "** still remains more or less of a whited sepulchre and it is questionable whether the vast expenditure entailed by alterations equal to those carried out in the **" Repulse "** can be allotted at present.

Amongst the novel features introduced into these ships are the triple mounting for the 4-inch guns, and the modified " bulge " anti-torpedo protection along and below the water-line which is a development of the huge " blisters " fitted to the Monitors. Against these a torpedo can explode and expend its energy without damaging the hull proper, while the extra beam involved is not sufficient to detract from high speed.

Dimensions.—" Renown " 794 × 90 × 30¼ feet = 26,500 tons nominal and 32,700 tons full load displacement. **" Repulse "** 794 × 102⅔ × about 31½ feet = 38,000 tons full load displacement.



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excellent pens on offer, and for these a good inquiry was experienced, and in sympathy with other markets prices for the best class were up to sellers' expectations. Secondary sorts and those not too well summered met a slower demand, and were more difficult to cash, leaving little or nothing for their summer's keep. The top price of £16 12s 6d for bullocks was secured by Mr MacDonald, Tamlan, while heifers were topped by Mr Rae, Norikiln, at £15 7s 6d. Highland cattle were quite a good selection, but met a very quiet inquiry, this class showing a drop in price from the summer sales of from £2 10s to £3 per head. Nice quality stirks, however, met quite a fair demand at a much lesser drop than the older classes. Weaned calves of the best class met a good demand.

EAST LINTON

Messrs John Swan and Sons, Ltd., held their annual [illegible] sale of home-grazed and Irish feeding and wintering bullocks and stirks at East Linton, when there presented 1052 of all classes. [illegible] cattle were a nice selection. An excellent [illegible] was experienced. The show of Irish cattle [illegible] the [illegible] presented at this centre for several [illegible]. A [illegible] trade was met.

Home cattle [illegible], black polled bullocks, to £15 17s 6d; do., black polled stirks, to £14 5s; [illegible], black polled bullocks, £16 7s 6d; [illegible] coloured stirks, £[illegible] 12s 6d; Duncanlaw, [illegible] bullocks, £13 12s 6d; Garvald Grange, [illegible] stirks, £9; [illegible], suckled calves, £9; [illegible] £1[illegible] 10s; Tanderlane, coloured stirks, to £14 [illegible]

[illegible]

AYR

WATSON AND BATCHELOR.

Messrs Watson and Batchelor held their second special sale of breeding and feeding ewes and all classes of lambs at Ayr, when there was a good offering forward. All classes of ewes met a good trade at prices fully above those ruling last week. Cross-bred lambs were in demand and advanced quite 2s per head on last sale's quotations. Blackface lambs also met a rise in price. A total of 40 Border Leicester rams were in request at satisfactory rates. Lots and prices:—

UNCROSSED EWES.

Dunblane	24/-	Benston	15/-
Sh Loch	23/9	Cleneard Moor	14/3
Knockta h	23/3	Auchleffan	11/9
Mossdale	12/3	Aitknowe (Ch)	22/-
Barrhoe	17/9	Belston (cross)	35/6

CROSSED EWES.

Craig, Pinwherry	14/-	Corwar	16/3
Auclencross	10/6	Dangart (x gim.)	20/6
Hil Cumnock	10/6	Pinmore	14/6
Hartfield	15/-	Broadshean	10/3
Munnoch	12/-	Portiye	10/3

CROSS LAMBS

[illegible]

Midgehope	13/6, 15/3
Meodlaw	23/-
Eskdalemuir (Linn)	18/3
Dumcdling	15/3, 21/-
Upper Stenneswater	16/-, 13/6
Effgill	15/6, 16/9
Garwald	22/-, 23/-
Crossdykes	18/-, 19/-
Watcarrick	15/-
Kirkland	16/6
Potburn	16/9, 16/-
Longbedholm	19/-
West Buccleuch	20/-
Tanlawhill	14/9
Breconside	17/6
Archbank	17/6, 13/9
Deephope, Ettrick	14/-
Bellview	18/-
Windshields	16/-, 13/-
Cote, Eskdalemuir	25/9
Carplegill	19/6
Castle O'er	6/6, 15/6
Glendinning	17/-, 12/6
Westwater	16/3
Waterhead of Dryfe	22/3, 13/-
Alton	15/6
Whitcastles	14/9
Reddings, Moffat	18/-, 13/9
Ettrick Hall	14/-
Winterhope	18/-, 13/9
Pennaldburn	17/-, 16/3
Fingland, Tweedsmuir	

RENOWN.

Refuse.

Armament.—Six 15-inch guns in three turrets, two forward and one aft; seventeen 4-inch guns in five triple and two single mountings. The triple mounting was designed to secure the maximum concentration of fire from the most advantageous positions without interference, but are not altogether a success. They are disposed in wing positions abreast the foremost funnel and along the centre-line before and abaft the main mast, while the single guns are by the sides of the raised turret. A couple of A.A. guns are carried abreast of the second funnel. **" Renown "** carried two submerged torpedo tubes, but these have been removed from **" Repulse "** and replaced by eight above-water tubes in pairs.

Machinery.—Turbines of 120,000 H.P. driving four screws = 30 knots designed speed, which has been considerably exceeded in service. 42 boilers. Fuel (oil only) = about 4,250 maximum. Complement 1,220.

Protection.—As completed consisted of a 6-inch belt along the water line between the end turrets, with a short 4-inch internal continuation forward, and 3 inches aft.

Apart from this the whole hull side is unarmoured in **" Renown "** but **" Repulse "** has a 9-inch belt along the water-line with 6 inches over the main deck side between the end turrets. The gun houses are 11-7 inch, and barbettes 7-4 inch.

Appearance.—As first completed the funnels were the same height, but in 1916 the foremost was raised to clear the bridges. Lacking side armour the **" Renown "** has scuttles along the main deck; these are conspicuously absent in **" Repulse."** From **" Hood "** they are easily distinguished by their unequal funnels and absence of raised turret aft.

REPULSE.—Built at Clydebank, Jan., 1915—Aug., 1916 (19 months). Joined the Grand Fleet and served with the 1st B.C.S. until 1919. In action Nov. 1917 with German light cruisers. Underwent a long re-fit 1919-20 and has since served in the B.C.S. Atlantic Fleet.

RENOWN.—Built at Fairfield, Jan., 1915—Sept., 1916 (20 months). Joined the Grand Fleet in Sept. 1916, and served in 1st B.C.S. until 1919. Conveyed H.R.H. The Prince of Wales on his tour to U.S.A. and Australasia 1920-21, and to India and Japan 1921-22. Now in Reserve at Portsmouth.

The "HOOD"

In view of the uncertainty as to what will constitute the Capital Ship of the future, it is quite possible that the **"Hood"** will be the last of the Great Ships as we now know them—the apotheosis of the Line of Battleship era dating from the **"Warrior"** of 1860. Originally four ships of her class were laid down in 1916 to meet certain German battle-cruisers, but when it was learned that work had ceased on these in 1917, the construction of the **"Rodney," "Howe,"** and **"Anson"** was stopped while they were still on the stocks, and only the **"Hood"** was completed. As first projected they were to have been glorified **"Renowns"**—lightly armoured, shallow draft, 33 knot ships unfit to lie in the line of battle. After Jutland the design was recast. Five thousand additional tons of armour was allowed for at the expense of a couple of knots speed, the result being a compromise of great offensive powers, adequate protection and high speed which places the **"Hood"** in a unique position amongst the world's warships.

In a general way she is a battle-cruiser edition of the **"Queen Elizabeth,"** the great increase in displacement being absorbed by the colossal engine power required to raise the speed from 25 to 31 knots. The same armament is carried, excepting that the 6-inch guns have been replaced by 5.5-inch—a calibre introduced into the Service with the **"Chester"** and **"Birkenhead,"** which were taken over from Greece—and whose spare guns and mounts were utilised for the **"Hood"** and **"Furious."** In comparison with the **"Queen Elizabeth"** it will be noticed that the secondary battery has been raised a deck and spaced out amidships, the guns being behind splinter shields only and without any armour or screen protection.

A marked feature of the hull is the sheer fore and aft and the flare which is continuous from the bows to the stern. The falling inboard of the ship's side is intended to assist in keeping out projectiles by diminishing the chance of a direct hit at right angles; this flare is such that the outer edge of the bulge is in the perpendicular to the topside of the hull.

Although nominally a post-Jutland ship the **"Hood"** does not embody the most modern ideas as regards protection, which demand a far greater percentage of the total displacement than was allotted to armour in her design; in the two new ships which are to be laid down under the Washington Agreement a different system of armour disposition will be introduced, protection being regarded as a greater asset than extreme speed—with its consequent increase in hull length and area to be armoured—so that thicker armour can be concentrated where required. It is also understood that the time honoured disposition of the big guns in pairs will also be abandoned in future, and the triple mounting adopted.

Hood.

Hood

Her conspicuous features are the marked sheer fore and aft, great length, and flared sides with bulge protection ; the great conning tower and big range-finders on the crowns of the turrets, control top and conning towers ; the well-spaced secondary battery along the superstructure deck, and the massive mast and funnels. No ship has ever before presented such an appearance of the embodiment of power and speed, and no future capital ship is likely to equal her in beauty and proportion.

Dimensions.—860½ × 105 × 31½ feet = 41,200 tons normal and 44,600 tons full load displacement.

Armament.—Eight 15-inch and twelve 5.5-inch guns ; four 4-inch A.A. and nine smaller guns ; two submerged, and four above-water torpedo tubes in pairs. Designed for sixteen 5.5-inch, four guns were suppressed as unnecessary and entailing additional personnel.

Machinery.—Geared turbines of 144,000 H.P. driving four screws = 31 knots. On trials she made just over 32 knots. Oil fuel = 4,000 tons maximum. 24 Yarrow small tube boilers. Complement 1,440.

Protection.—Waterline belt 12-6 inches ; main deck 7-5 inches ; forecastle deck 5 inches from forward turret to after conning tower. Turrets 15-11 inches, barbettes 12 inches above and 6 inches between decks. Horizontal protection very strong, totalling 7 inches. Special protection over magazines, boiler and engine rooms, bulges, and ship's side under water.

Appearance.—Much longer and less piled-up than the **" Renown ",** while her funnels are the same height instead of the foremost being raised.

HOOD.—Built at Clydebank, Sept., 1916—Mar., 1920. Now serving as flagship in the B.C.S., Atlantic Fleet, and together with **" Repulse "** represented the British Navy at the celebrations of the Centenary of the Brazilian Independence, 1922.

CRUISERS

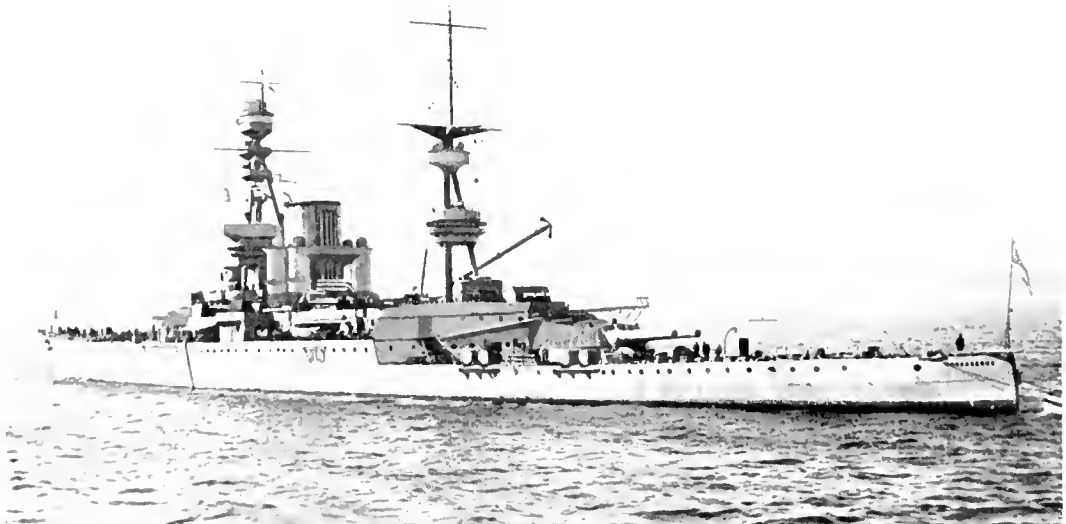
"COURAGEOUS" class (2 ships), Emergency War Programme

COURAGEOUS, GLORIOUS

The raison d'etre of these two ships has never been explained satisfactorily. Laid down in 1915 there were originally three of the class which with the **"Repulse"** and **"Renown"** constituted the famous group of "Hush-hush" ships intended by Lord Fisher for the special naval force in his Baltic Project. Had it been possible at that time to obtain sanction for the construction of more armoured ships, presumably they would have been sisters to the **"Renown"** or modified editions of that type. As it was, authorisation could be obtained for light cruisers only and the **"Courageous," "Glorious,"** and **"Furious"** were therefore designed as "large" ships of this type embodying the heavy guns, high speed and light draught which Lord Fisher postulated for the intended operations. This being the case they can only be regarded as "the next best thing" rather than ships carefully calculated to fill our naval requirements, and must be judged accordingly.

In design they suffer from being too strong and too weak. For light cruiser work they are ludicrously overgunned, while the absence of armour precludes their being employed as battle-cruisers—the Fisher dictum that "Speed is the best Protection" having been proven a fallacy at Jutland. As a covering force they had possibilities—but were an expensive luxury. Everything might have been said in their favour if they had had a chance of proving their worth, but as things turned out they must be regarded as "white elephants." The fact that the **"Furious"** was converted into an air-craft carrier when she was on the point of completion as a cruiser shows that no very high value was placed upon her value in that respect, while both **"Courageous"** and **"Glorious"** are ear-marked for similar conversion at some future date.

COURAGEOUS



COURAGEOUS

With regard to the design, the demand for about 5 feet less draught than usually obtains in capital ships was undoubtedly the factor to which other features had to be accommodated. The hull is merely that of an overgrown light cruiser, while the lines are so fine forward that the beam is only 71 feet at the fore turret section 240 feet from the bow. In order to realise the great speed demanded, four sets of geared turbines of the same type as were introduced in the **"Champion"** were fitted. The secondary armament is carried in triple mountings and disposed in much the same way as in **"Renown,"** while the large number of torpedo tubes is a notable feature.

Dimensions.—786¼ × 81 × 22¼ feet = 18,600 tons nominal and 22,700 tons full load displacement. Complements 1,130.

Armament.—Four 15-inch guns in two turrets; eighteen 4-inch in six triple shields; two A.A. and nineteen smaller guns. Twelve above water tubes and two submerged torpedo tubes. Mine rails are fitted aft.

Machinery.—Geared turbines driving four screws of 90,000 designed H.P. = 32 knots. Fuel = 3,250 tons of oil.

Protection.—3 inches over the hull side between the turrets; 2 inches within the hull for 100 feet forward; vertical protection about 5 inches. Big gun barbettes 7-3 inches and turrets 9-7 inches. Modified bulges 25 feet deep.

Appearance.—Easily distinguished by their single enormous funnel and two turrets. There are no obvious differences between the two ships.

COURAGEOUS.—Built by Armstrongs, Mar., 1915—Jan., 1917. (Both ships were intended to be finished in twelve months). Served in the Grand Fleet 3rd L.C.S. and 1st C.S. until 1919 when she became gunnery ship at Portsmouth. Now Flagship of Reserve force.

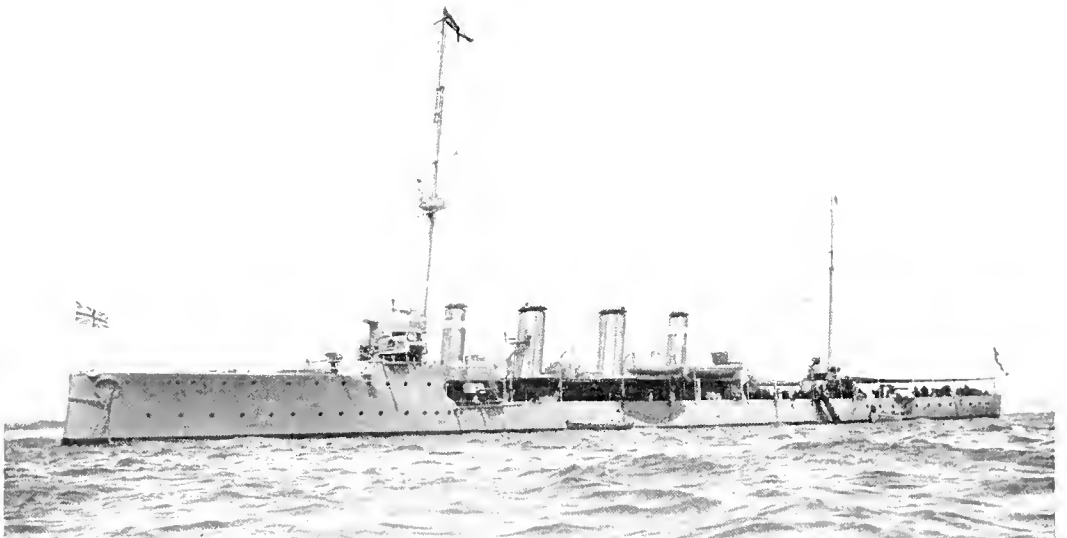
GLORIOUS.—Built by Harland and Wollf, Belfast, Mar., 1915—Jan., 1917. Served as **"Courageous"**; Flagship 3rd L.C.S. May 1917, afterwards of 1st C.S. Became gunnery ship at Devonport 1919 and is now Flagship of Reserve.

DEVELOPMENT OF CRUISER DESIGN 1895 TO 1922

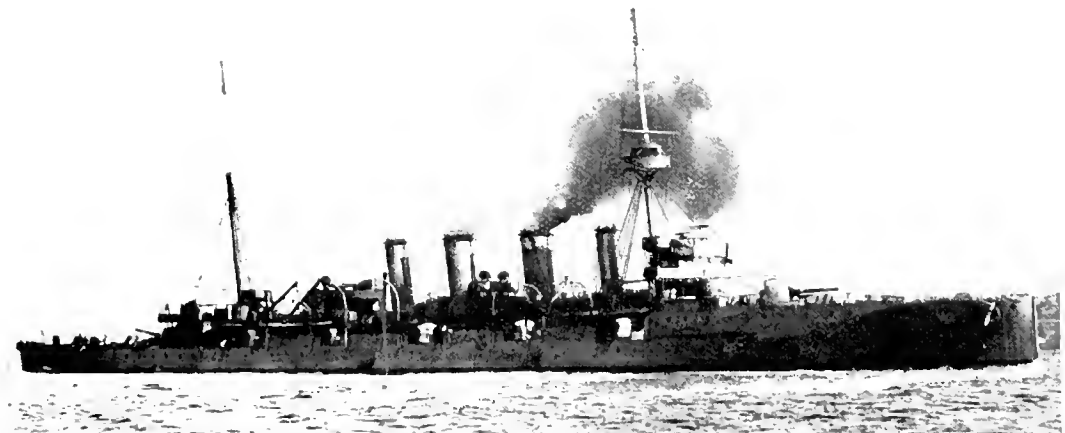
The generic term " cruiser " has been used to describe a motley of types ranging in displacement from 14,000 to 2,000 tons which come into the category of cruising ships. Formerly they were divided in 1st, 2nd, and 3rd classes, but in 1913 the terms " cruiser " and " light cruiser " were substituted to differentiate the old armoured cruisers and first class protected cruisers from the second and third classes, scouts and modern types. As no dividing line of displacement was decided upon the new classification led to several anachronisms, " light " cruisers in some cases being heavier than the " cruisers," but the gradual elimination of the older ships has resulted in the disappearance of all the " cruisers " except two.

Unlike the battleship, the cruiser has not developed along the lines of systematic increase in offensive and defensive powers owing to the several duties which fall to their lot, and for each of which a separate type has been evolved. The " fleet scout ", " commerce protector," and such vessels whose sole excuse for existence was apparently " Showing the Flag," sacrificed one or other of the essentials (1) speed (2) armament (3) radius of action (4) sea-worthiness or (5) cheapness, as their activities demanded, but until 1895 they were kept to moderate dimensions 4,000—7,000 tons and the two largest did not exceed 9,000 tons. The tendency was to work round and about 4,000 tons as being a satisfactory figure on which a fair compromise of military qualities could be obtained, while the relative cheapness allowed for numbers to be built—and " numbers " is an essential for which " individual superiority " cannot be substituted in the matter of cruisers.

When, however, the Russians produced the 11,000 ton **" Rurik "** and **" Rossia "**—to which we replied with the **" Powerful "** and **" Terrible "** of 14,000 tons—a new element can be said to have entered into the question of design, i.e., that of individual competition. From thence onwards the construction of cruisers for cruising duties only was modified by the seeming necessity of individual superiority over possible enemy types, and the value of numbers was placed in the background. Armoured cruisers replaced the big " protected " cruisers and between 1895 and 1905 growth in armament and protection—



Boadicia.



Bristol.

but not speed—became such that in the later phases our " armoured cruisers " were equal in fighting power to many foreign second-class battleships. Cost precluded numbers, consequently such ships were constructed in batches of from two to four, and in the meantime the cult of the smaller cruiser had languished. According to the strategists they were unnecessary. Enemy squadrons would be bottled up at the outbreak of war, and wireless having reduced the requirements of " fleet scouts " from two per battleship to two per squadron, it was considered that the existing numbers were adequate. Furthermore, destroyers had increased in size to such an extent that their employment in lieu of cruisers was seriously suggested. Thus, during the " armoured cruiser " period only the five **" Encounters "** of 5,900 tons armed with eleven 6-inch guns, and four **" Gems "** of 3,000 tons carrying twelve 4-inch guns were constructed. Such other " cruisers " as were built were intended for work with the destroyer flotillas, the eight **" Scouts "** of circa 3,000 tons and four **" Boadicias "** being armed with twelve 12-pounders only, and the slightly enlarged **" Actives "** (3) with ten 4-inch guns. In 1908, however, the menace of the steadily increasing number of German light cruisers, which possessed high speed and a heavier armament than our ships, caused a reversal of the former policy of " commerce protection " cruiser construction, and five vessels of the **" Bristol "** class were laid down in 1909. In general design these were enlarged **" Actives "** of 4,800 tons carrying a couple of 6-inch and ten 4-inch guns and able to steam at 25 to 26 knots—good serviceable ships for foreign stations and the work they had to perform during the War, but hardly weatherly enough for Home waters. The five 4-inch in the waist on either side proved to be very wet in a sea-way owing to their low command, and all the ships had a bad name for rolling. After the Armistice they were put into Reserve and are now either sold or on the sale list. In the subsequent classes it will be seen how the **" Bristol "** served as a basic design from which the **" Birmingham "** was evolved, after which the demand for speed and cheapness led to the re-introduction of the small light cruiser and the commencement of a fresh cycle of development which the ships at present under construction seem likely to terminate.

LIGHT CRUISERS

The "WEYMOUTH" class (3 ships), 1909 Estimates

WEYMOUTH, YARMOUTH, DARTMOUTH

Excepting for a slight increase in beam these ships have the same dimensions as the **"Bristols,"** but are considerable improvements on them by virtue of their armament and gun distribution. Instead of a mixed armament of 6-inch and 4-inch, they were given 6-inch guns only of which three were carried on the forecastle, four in the waist and one on the quarter deck—eight in all. Having been laid down before the **"Bristols"** were completed the disadvantages of the low command amidships had not been demonstrated, and to some extent they suffer in the same way as their predecessors excepting that the berthing amidships is only pierced for one gun, and which is consequently not so liable to be washed out. The guns being of uniform calibre have all the attendant advantages in the matter of control, and during the war they were fitted for director firing, the pole mast forward being replaced by a tripod.

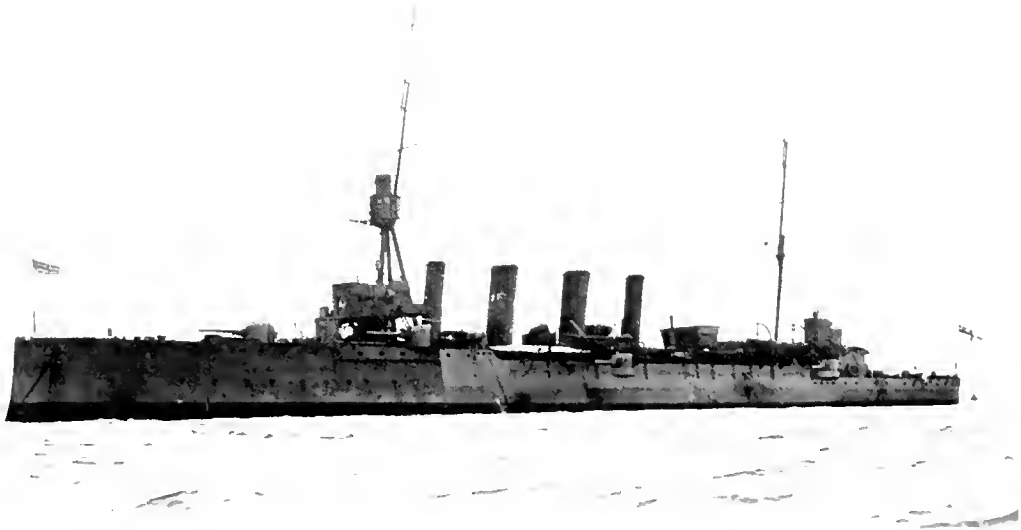
Dimensions.—453 × 48½ × 17½ feet = 5,250 tons normal, and 5,870 tons full load displacement.

Armament.—Eight 6-inch, one 3-pounder A.A. and eight smaller guns. Two submerged 21-inch torpedo tubes on the broadside.

Machinery.—Turbines of 22,000 H.P. driving four screws = 25 knots. On trial they realised from 25.6 to 26 knots. Coal = 1,290 tons maximum plus 260 tons of oil, giving a radius of 5,600 miles at 10 knots. Complement 470.

Protection.—There is a 2-inch steel deck amidships of the engines and boilers, which is continued fore and aft as 1—¾ inch. The guns have thin splinter shields only.

YARMOUTH.



YARMOUTH.

LIGHT CRUISERS

"WEYMOUTH" class (*continued*)

Appearance.—Are well-proportioned and handsome ships with slightly ram bows and cruiser stern. Distinguished from the later **"Town"** classes by lower position of amidships gun and shape of stem and stern.

DARTMOUTH.—Built by Vickers, Feb., 1910—Oct., 1911. Served in the Home Fleet and East Indies until 1914. Employed hunting German raiding cruisers in Indian and African waters 1914—15. Grand Fleet 2nd L.C.S. and Mediterranean 1915; Adriatic 1916-19 (cruiser actions with Austrian warships) torpedoed June 1917; S. American station 1919-21; now in Reserve at Devonport.

WEYMOUTH.—Built at Elswick, Jan., 1910—Oct., 1911. Served in Home Fleet and Mediterranean to 1914, hunting German raiding cruisers in Indian and African waters 1914; East India, East Africa and Adriatic 1915; Grand Fleet 6th L.C.S. 1916; Adriatic (Commodore) 1917-19; since then has been in Reserve at the Nore.

YARMOUTH.—Built by London and Glasgow Co., Jan., 1910—April, 1912. Home and China squadrons to 1914. Chase of **"Emden"** China and Indian Ocean 1914; Mediterranean 1915; Grand Fleet 2nd L.C.S. 1915; 3rd L.C.S. 1915-17; 2nd L.C.S. 1918; Africa Station 1919-20; now Signal School at Portsmouth.

LIGHT CRUISERS The "CHATHAM" class (3 ships) 1910 Estimates and (3 ships) (R.A.N.)

CHATHAM, DUBLIN, SOUTHAMPTON, MELBOURNE, SYDNEY, BRISBANE

Sea experience having exposed the weak points of the two previous classes, the mistake of reducing the freeboards amidships was realised and in these ships the forecastle is continued right aft to the main mast and at this height five of the eight 6-inch guns are carried. Despite the extra height above water the guns' crews suffered a lot from the inadequacy of the shield to protect them from splinters and fire during action, and wet and cold when at stations—a failing common in most cruisers. **"Town."** A commencement was made in this class of fitting side armour in addition to the protective deck, a practice which was continued in all subsequent classes.

Dimensions.—457 × 50 × 17¾ feet = 5,400 tons normal and 5,945 tons full load displacement.

Armament.—Eight 6-inch guns; one 3-inch A.A. and fourteen smaller guns. Two submerged 21-inch torpedo tubes on the broadside.

Machinery.—Turbines of 22,000 H.P. driving 4 screws (2 in **"Southampton"**) = 25.5 knots. Coal 1,240 tons maximum, plus 260 tons oil. Radius of action is 4,680 miles. Complement, 470/500.

Protection.—For 175 feet amidships the side is made up of 3-inch plating which extends from the quarter deck level to some distance below the water line.

Appearance.—Differentiated from the **"Weymouth"** class by clipper bow and cut-away stern; also the amidships gun is on forecastle deck level.

CHATHAM.—Built at Chatham Dockyard, Jan., 1911—Dec., 1912. Served in Mediterranean Fleet to 1914; Mediterranean and East Indies 1914-15; Grand Fleet 3rd L.C.S. (flag) 1916-18; in Reserve at Nore until 1920 when she was presented to the Dominion of New Zealand.

DUBLIN.—Built by Beardmore, April, 1911—Mar., 1913. Served in Mediterranean until 1914; Mediterranean and Gallipoli 1914-15; Adriatic Force 1915-17; Grand Fleet 2nd L.C.S. 1917-19; Mediterranean 1920 (temp.) and Africa stations to date.

SOUTHAMPTON.—Built at Clydebank, April, 1911—Nov., 1912. Home Fleet until 1914 when she became Flag of 1st L.C.S.; 2nd L.C.S. (flag) 1915-17 (Jutland); 3rd L.C.S. 1918; S. American station (flag) 1919-20; East Indies 1921-22 (flag).

DUBLIN.

BIRMINGHAM

Royal Australian Navy.

BRISBANE.—Built at Sydney Dockyard, Jan., 1913—Nov., 1916. On convoy duty from Australia and in Mediterranean until 1918. Since in Australian waters.

MELBOURNE.—Built by Cammell-Laird, April, 1911—Jan., 1913. Operations against German raiders 1914-15 in Australian waters 1914; N. Atlantic and W. Indies 1915; joined Grand Fleet; 2nd L.C.S. 1916-18; returned to Australia 1919.

SYDNEY.—Built by London and Glasgow Co., Feb., 1911—June, 1913. Served as **"Melbourne"** (sunk **"Emden"** Nov., 1914).

"BIRMINGHAM" class (3 ships) 1911 Estimates and R.A.N.
BIRMINGHAM, LOWESTOFT, ADELAIDE

Excepting that they carry an extra 6-inch gun on the forecastle, these three ships are sisters to the **"Southampton"** class. They represent the last development of the original **"Bristol"** type and the end of the cycle of medium-sized broadside cruisers. Their dimensions limited numbers and in the **"Undaunted"** class which followed a reversion was made to the 3,000 odd tons, which served as a basis for a fresh development.

Dimensions, Machinery and Protection.—As **"Southampton."**

Armament.—Nine 6-inch, one 3-inch A.A., four 3-pounders (**"Adelaide"** one 12-pounder) and ten smaller guns. Two submerged tubes.

Appearance.—The search-light top at funnel level on tripod and high platform between the third and fourth funnels distinguish **"Birmingham"** and **"Lowestoft"** from the earlier classes. **"Adelaide"** has a stump mainmast.

BIRMINGHAM.—Built at Armstrongs, June, 1912—Jan., 1914. Served in the 1st L.C.S. Home Fleet until 1914, and then 1st L.C.S. Grand Fleet; 2nd L.C.S. 1915-19. (Jutland). The first ship to sink a German submarine, U. 15, in Aug., 1914. Flagship African station 1919-20; in Reserve at Nore 1921-22.

LOWESTOFT.—Built at Chatham Dockyard, July, 1912—April, 1914. Grand Fleet 1st L.C.S. 1915; Mediterranean 1916-19; African Station 1919-22 (flag).

ADELAIDE.—Built at Sydney, 1915—1922.

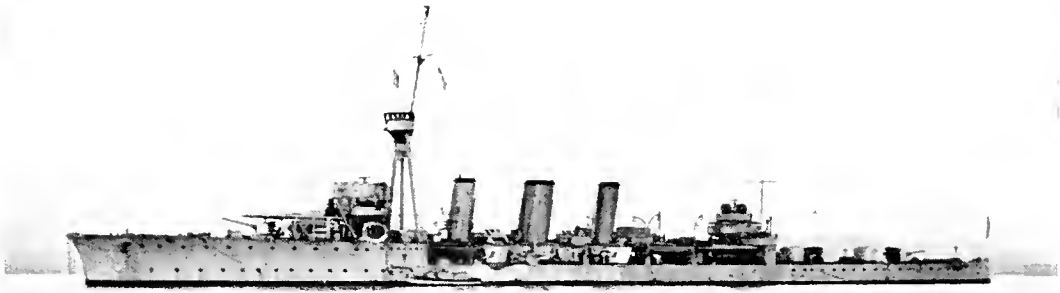
AURORA, PENELOPE

A splendid little compromise of cruiser qualities and one of the best all-round fleet-cruiser designs ever produced. Conceived along the lines of an improved **"Fearless"** (1911) and ignoring the preceding **"Birmingham"** class as being "cruising ships," the **"Undaunted"** manages to combine all the qualities in which her prototype was so notorously deficient in a hull some 30 feet longer and slightly narrower—a piece of constructional conjuring largely due to the space economy resulting from the substitution of oil fuel for coal.

The **"Fearless"** class were failures, inasmuch as they were too lightly armed, too slow, and of too restricted a radius of action, besides being indifferent sea boats; all these defects were overcome in the **"Undaunted,"** and in addition her hull was armoured—the only feature inherited from the **"Birmingham."** Her shortcomings, such as they were, lay in the mixed armament of 6-inch and 4-inch guns and a certain liveliness in a seaway—a drawback inherent to a ratio of length to beam of II : I in conjunction with light draught.

At the time of their inception the **"Undauntеds"** were described as "destroyer-destroyers" —which to some extent explains the reason of their two-calibre armament—but war experience stressed most upon their cruiser qualities and the necessity for a heavier broadside led to modifications in their gun-power at a later date. Subsequent developments in the "C" classes only show what might have been produced on the same dimensions, had not the advantages of the single-calibre armament been discounted in favour of the more numerous anti-destroyer battery.

Dimensions.—436 × 39 × 13½ feet = 3,500 tons nominal displacement; when fully loaded they exceed this by about 900 tons. The ratio of length to beam is greater than in any other warship extant, including destroyers.



PENELOPE.

GALATEA.

LIGHT CRUISERS

"UNDAUNTED" class—*continued.*

Armament.—As originally completed, they all carried a single 6-inch gun on the forecastle and quarter deck and three 4-inch guns and a pair of 21-inch torpedo tubes on either side amidships. **"Aurora"** is so armed still, but the rest of the class have had the aftermost pair of 4-inch replaced by a 6-inch gun on the centre-line and an additional pair of tubes mounted on each beam. Two or more A.A. guns are also carried, varying from 4-inch to 2-pounders.

Machinery.—Turbines of 30,000 H.P. driving four screws = 28 knots, which is said to have been exceeded at times. 8 Yarrow boilers. Burn oil fuel only and carry 810 tons.

Protection.—The hull side, except for the forecastle and some thirty feet aft, is composed of 1½-3 inch plating and the deck is 1 inch thick.

Appearance.—Originally were graceful, rakish-looking ships with a pole mast forward and a small conning tower. The tripod and director top were fitted about 1916 and the searchlights moved to the control position amidships; at a later date the conning tower was removed to make way for the aeroplane platform forward.

AURORA.—Built at Devonport Dockyard, Oct., 1912—Oct., 1914. Harwich Force 10th flotilla cruiser 1915-16 (Dogger Bank action 1915); 5th L.C.S. 1917; Grand Fleet 7th L.C.S. 1918-19. Presented to Royal Canadian Navy 1920.

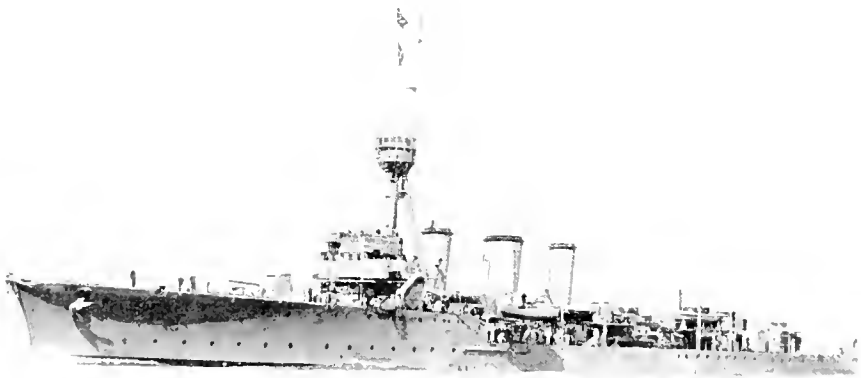
PENELOPE.—Built by Vickers, Feb., 1913—Dec., 1914. Harwich Force 5th L.C.S. 1915-18; Grand Fleet 7th L.C.S. 1918-19. Now paid off at the Nore. **"Galatea," "Inconstant," "Phaeton," "Royalist," and "Undaunted"** either sold or on the Disposal List.

"CAROLINE" class (6 ships) 1913-14 Estimates

CAROLINE, CARYSFORT, CLEOPATRA, COMUS, CONQUEST, CORDELIA

The six ships of the **"Caroline"** class—slightly enlarged and improved **"Arethusas"**—are of special interest as illustrating the indecision which characterised the cruiser armament policy that obtained between 1913 and 1915. As designed they carried a mixed armament of 6-inch and 4-inch guns, but at various times between 1916 and 1918 the smaller pieces were removed in twos and sixes and single 6-inch substituted, until they carried a uniform armament. In general profile they resembled the **"Arethusas"** but had a couple of 4-inch on the forecastle instead of a 6-inch, and two more up abreast of the bridge instead of in the waist, where they only carry four. Aft were the two 6-inch, one being mounted on the shelter deck and firing over the quarter deck gun, these being the first cruisers in which superfiring guns were introduced. A blast screen projects outboard around the shelter deck up to the rear of the lower shield so that direct astern fire would not cause trouble. Amidships was a pair of tubes on each broadside. During 1916-17 the foremost pair of 4-inch were removed and a 6-inch gun substituted, while a gaunt tripod with a control top replaced the pole mast. As the futility of arming such cruisers with 4 inch became apparent—in addition to the difficulty in controlling a mixed armament—further alterations were effected during 1917-18 and the remaining 4-inch were taken out to make way for a single 6-inch on the centre-line amidships. Thus by stages they changed from ten-gunned mixed-calibre to four-gunned single calibre ships, and—in light of subsequent designs—must be regarded as good ships which just missed being very much better. An additional pair of torpedo tubes are mounted on each side amidships in lieu of the guns, and as far as armament is concerned they are very different now from what they were originally. What they might have been can be gauged from subsequent designs. All are now seeing their last spell of service and will shortly be relegated to the Disposals List.

CORDELIA.



CONQUEST

LIGHT CRUISERS—"CAROLINE" class (*continued*)

Dimensions.—446 × 41½ × 16 feet = 3,750 tons nominal and 4,780 tons full load displacement.

Armament.—Four 6-inch along the centre-line; two 3-inch A.A. (four 3-pounders in **"Caroline"**) and nine smaller guns. **"Cleopatra"** has eight 21-inch torpedo tubes in four pairs; the rest two pairs only.

Machinery.—Turbines of 30,000 H.P. = 28½ knots. 4 screws. 8 Yarrow boilers. Fuel = 917 tons oil.

Protection.—As in **"Arethusa"** class.

Appearance.—Distinguishable from the **"Arethusa"** class by absence of flying-off platforms forward, and arrangement of after guns. **"Cleopatra"** carries her second 6-inch just forward of the stump mast; in the rest it is abaft the third funnel. **"Cordelia"** and **"Caroline"** only have the heavy s.l. control station amidships.

CAROLINE.—Built by Cammell-Laird, Jan., 1914—Dec., 1914 (a record time for light cruiser construction). Grand Fleet IV flotilla cruiser 1915; 1st and 4th L.C.S. 1915; 4th L.C.S. 1915-18; (Jutland); East Indies 1919-21; Now paid off at Portsmouth.

CARYSFORT.—Built at Pembroke Dockyard, Feb., 1914—June, 1915. Grand Fleet flotilla cruiser 1915; Harwich Force 5th L.C.S. (flag) 1916-17; Grand Fleet 7th L.C.S. 1918-19 (flag); Atlantic Fleet 2nd L.C.S. 1920-22.

CLEOPATRA.—Built at Devonport Dockyard, Feb., 1914—June 1915. Harwich Force 5th L.C.S. 1915-18; in action with German destroyers Mar. 24, 1916 and damaged by explosion when ramming and sinking one; afterwards in collision with **"Undaunted"**; mined off the Dutch Coast Aug. 4, 1916; Grand Fleet 7th L.C.S. (flag) 1918-19; 1st L.C.S. 1919. Now in Reserve at the Nore.

COMUS.—Built by Swan Hunter, Nov., 1913—May, 1915. Grand Fleet 4th L.C.S. 1915-19; helped sink the raider **"Greif"** Feb., 29, 1916; (Jutland); 1st L.C.S. 1919; East Indies 1919-22.

CONQUEST.—Built at Chatham Dockyard, Mar., 1914—June, 1915. Harwich Force 5th L.C.S. 1915-18; in Reserve 1918-22; now Capt. (S) 1st flotilla Submarine Atlantic Fleet.

CORDELIA.—Built at Pembroke Dockyard, July, 1913—Jan., 1915. Grand Fleet 1st L.C.S. 1915—17; (Jutland); 4th L.C.S. 1917-19; Atlantic Fleet 2nd L.C.S. 1919-22. Now in Reserve at the Nore.

LIGHT CRUISERS

"CHAMPION" class (6 ships) 1913-14 and 1914-15 Estimates

CALLIOPE, CHAMPION, CAMBRIAN, CANTERBURY, CASTOR, CONSTANCE

Originally these ships belonged to two classes, the first two being two-funnelled editions of the **"Carolines"** armed with two 6-inch and eight 4-inch guns, and the rest carrying three 6-inch and six 4-inch with a torpedo armament in each case of two submerged tubes. All of them underwent the modification in gun power previously described, the **"Calliope"** and **"Champion"** being first fitted with three 6-inch and six 4-inch, and finally all six received four 6-inch plus A.A. and smaller guns. A tripod mast was placed forward instead of the pole mast with search-light and observation tops, the conning-tower was removed, and the usual s.l. control position added amidships; as the additional top weight caused them to roll to a marked degree, this later structure was taken out from most of them after the Armistice.

Dimensions.—As in **"Caroline"** class.

Armament.—Four 6-inch, two 3-inch A.A. and eleven smaller guns. Note that **"Canterbury"** has one 4-inch A.A. only. All carry 2 submerged tubes.

Machinery.—**"Calliope"** and **"Champion"** have geared turbines of 28,000 H.P. and 30,000 H.P. respectively = 27½ and 28½ knots. The latter has two screws, and reached 29 knots on trial with 41,000 H.P. The rest have four screws and turbines of 30,000 = 28½ knots. 8 Yarrow boilers. Oil fuel = 805/840 tons.

CANTERBURY.

CALLIOPE.

"CHAMPION" class (*continued*)

Protection.—As in **"Caroline"** excepting that **"Calliope"** and **"Champion"** have 4 inches of side plating amidships.

Appearance.—Distinguished from **"Caroline"** class by number of funnels. **"Champion"** still retains her s.l. control structure amidships and has no pole mast aft. They are very graceful looking ships, but look—and are—undergunned.

CALLIOPE.—Built at Chatham Dockyard, June, 1914—June 1915. Grand Fleet 4th L.C.S. (Commodore) 1915-19; (Jutland); N. America and West Indies 1919-20; since in Reserve at the Nore.

CAMBRIAN.—Built at Pembroke Dockyard, Dec., 1914—May, 1916. Grand Fleet 4th L.C.S. 1916-19; North America and West Indies 1919-22; 2nd L.C.S. 1922.

CANTERBURY.—Built at Clydebank, Oct., 1914—May, 1916. Harwich Force 5th L.C.S. 1916-18; Ægean and Black Sea 1918-19; Atlantic Fleet 1st L.C.S. (Temp.) 1919. Gunnery School Portsmouth 1920-22.

CASTOR.—Built by Cammell-Laird, Oct., 1914—Nov., 1915. Grand Fleet XI flotilla cruiser 1915 (Comm. D.) 1919; Atlantic Fleet (Comm. D.) 1919; 2nd L.C.S. 1920-22.

CHAMPION.—Built by Hawthorn Leslie, Mar., 1914—Dec., 1915. Grand Fleet XIII flotilla cruiser 1916-19; 2nd L.C.S. 1919; Portsmouth Torpedo School 1920-22.

CONSTANCE.—Built by Cammell-Laird, Jan., 1915—Jan., 1916. Grand Fleet 4th L.C.S. 1916-19; North America and West Indies 1919-22.

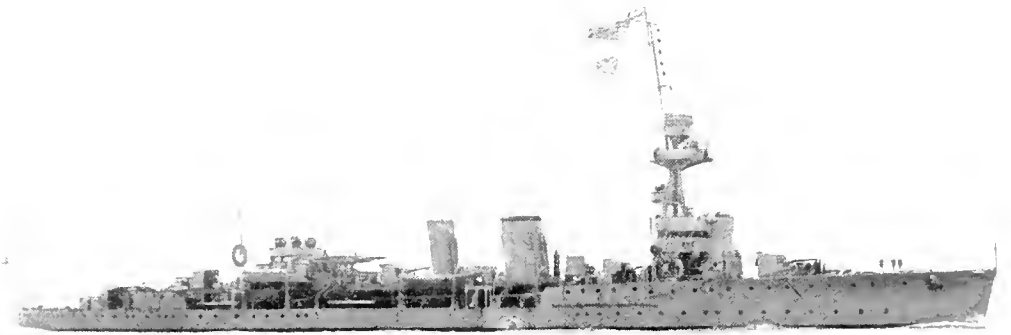
"CENTAUR" class (5 ships) Emergency War Programme

CENTAUR, CONCORD, CALEDON, CALYPSO, CARADOC

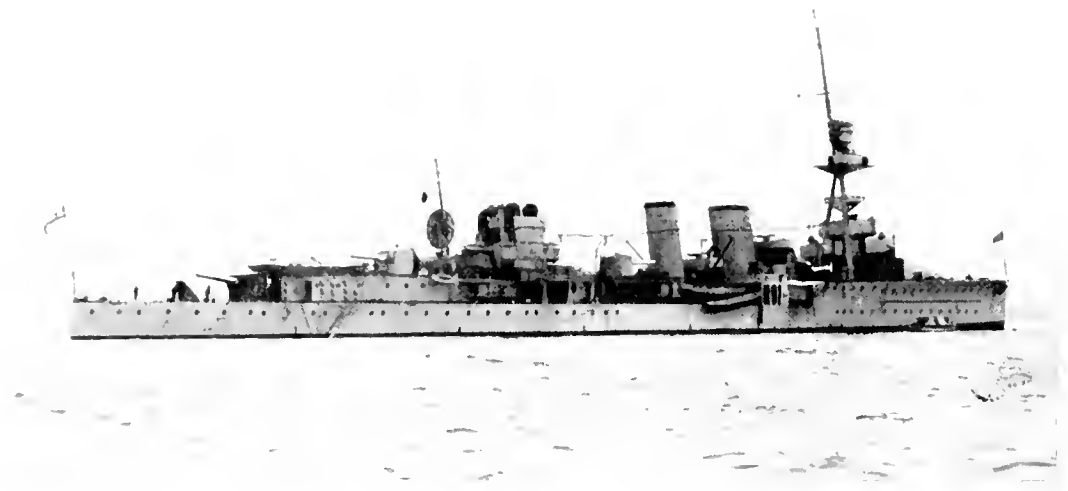
Of this class the **"Centaur"** and **"Concord"** were laid down in 1915 as sister ships to the **"Canterbury"** but designed to carry a uniform armament of 6-inch guns only, instead of the three 6-inch and four 4-inch guns with which the latter ship class were armed. In order to accommodate the extra centre-line gun the upper works were re-arranged, and comparing their profile with the previous class it will be noticed that the bridge and mast are slightly further forward and the funnels more amidships, so that the extra gun can be mounted on the forecastle deck between the mast and fore funnel, in which position it has a somewhat restricted arc of fire on each broadside.

The three later ships of the class are a few feet longer, have a different bow, and carry deck instead of submerged tubes. As completed they carried search light platforms on the foremast and up against the fore funnel, but at a later date the lights were removed to a control station amidships. **"Centaur"** and **"Concord"** have their A.A. guns on platforms before and abaft the central control tower, but the later ships carry them athwartships between the funnels, where the sky command is wider.

As sea-boats they are not altogether a success as they roll considerably and are wet forward in a seaway; at full speed they can make about 28 knots, although **"Centaur"** and **"Concord"** were designed for 27 knots only and the remainder for 29 knots.



CALEDON.
(Note Aeroplane platform amidships)



CARADOC

LIGHT CRUISERS

"CENTAUR" class (*continued*)

Dimensions.—450 × 42¾ × 16¼ feet = 4,120 tons nominal and 4,950 tons full load displacement, excepting "**Centaur**" and "**Concord**" which have the same dimensions as "**Champion.**"

Armament.—Five 6-inch guns along the centre-line; two 3-inch A.A. and sixteen smaller guns. Eight above water tubes in four twin mountings. "**Centaur**" and "**Concord**" two submerged tubes.

Machinery.—Turbines of 40,000 H.P. = 29½ knots. 8 Yarrow boilers. Oil fuel 935 tons.

Protection.—As in "**Cambrian.**"

Appearance.—Distinguished from previous class by (1) extra gun between the more widely spaced mast and funnel: (2) extra tops on tripod mast. "**Caledon**" has an aeroplane platform amidships, and all have straight cut-away bows excepting "**Centaur**" and "**Concord,**" which retain the clipper stem.

CALEDON.—Built by Cammell-Laird, Mar., 1916—Mar., 1917. Grand Fleet 6th L.C.S. 1917; 1st L.C.S. (Comm.) 1917-19; Home and Atlantic Fleets 2nd L.C.S. 1919-22.

CALYPSO.—Built by Hawthorn Leslie, Feb., 1916—June, 1917. Grand Fleet 6th L.C.S. 1917-19; (Baltic); Mediterranean 3rd L.C.S. 1919-22.

CARADOC.—Built by Scott's, Feb., 1916—June 1917. Grand Fleet 6th L.C.S. 1917-19 (Baltic); Mediterranean 3rd L.C.S. 1919-22.

CENTAUR.—Built at Elswick, Jan., 1915—Aug., 1916. Harwich Force 5th L.C.S. (Comm.) 1916-19 (mined Nov., 1917); Mediterranean 3rd L.C.S. 1919-22.

CONCORD.—Built at Elswick, Feb., 1915—Dec., 1916. Harwich Force 5th L.C.S. (Comm. temp.) 1917-19; Mediterranean 3rd L.C.S. 1919-22.

LIGHT CRUISERS

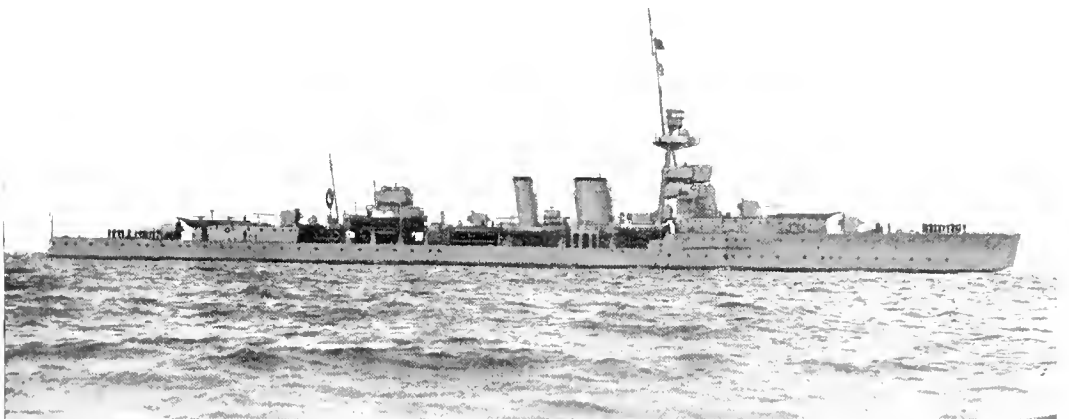
"CARDIFF" class (10 ships), Emergency War Programmes

CARDIFF, CERES, COVENTRY, CURACOA, CURLEW, CAIRO, CALCUTTA, CARLISLE, COLOMBO, CAPETOWN

No better example of progressive development can be cited than the evolution of the **"Cardiff"** from the **"Caroline."** Within the same dimensions to a foot or two, a ship 20 per cent. superior in gun fire is produced—the extra gun being placed a deck higher forward and capable of being fought in a seaway—without in any way compromising her other qualities. A comparison of their profiles will show that by adjusting and moving the boiler rooms further aft, the second gun in the **"Caledons"** has been worked in forward of the mast, leaving the remaining three in their relative positions. At the same time, an extensive shelter deck—meaning additional accommodation—has been added and the bridge raised in consequence, and the funnels have been kept sufficiently far aft not to make the control and director tops uninhabitable.

Although there are ten ships in the class, they were produced in two batches of five, **"Cardiff—Curlew"** and **"Cairo—Colombo"**; the later group are fitted with a "trawler bow"—a novel feature introduced to secure extra buoyancy forward. The forecastle is sheered up steeply from the foremost gun to the stem and the extra freeboard has made all the difference to their behaviour at sea, the five **"Cairos"** being much drier than the **"Cardiffs"**. In **"Carlisle"** and **"Capetown"** the customary bridge structure is replaced by an aeroplane hangar from which machines are able to rise with a run of eight feet only—indeed when steaming head to wind the 'planes had to be lashed down in order to prevent them from "taking charge." In order to lessen the resulting strain on the hangar when this was done, roller screens were fitted to close the front until the actual time of flight. Since the Armistice these hangars have been stripped and lightened as much as possible so as to lessen wind resistance and diminish rolling, the 'planes being no longer housed in them regularly.

Known as "Tyrwhitt's Dreadnoughts"—from the fact that they carry their guns in approximately the same manner as the 13.5-inch gunned battleships—they were completed too late for any opportunity of distinguishing themselves during the War.



CURAÇOA.

CALCUTTA
(Note Trawler bows)

LIGHT CRUISERS

"CARDIFF" class (*continued*)

Dimensions.—451½ × 43½ × 16½ feet = 4,190 tons nominal and about 5,020 tons full load displacement.

Armament, Machinery, and **Protection.**—As in "**Centaur**" class.

Appearance.—Distinguishable by the shelter deck and raised gun forward, and closer funnels. Viewed bows-on, the later five—especially those with the hangar—present an extraordinary appearance; the top of the hangar forms the bridge which is thus raised to an unprecedented height for this type of ship.

CAIRO.—Built by Cammell-Laird, Nov., 1917—Dec., 1919. China 5th L.C.S. 1920-22.

CALCUTTA.—Built by Vickers, Oct., 1917—Aug., 1919. North America and West Indies 8th L.C.S. 1919-22.

CAPETOWN.—Built by Cammell-Laird and Pembroke Dockyard, Feb., 1918—May, 1922. North America and West Indies 1922.

CARDIFF.—Built by Fairfield, July, 1916—July, 1917. Grand Fleet 6th L.C.S. (flag) 1917-19 (Baltic); Mediterranean 3rd L.C.S. (flag) 1919-22.

CARLISLE.—Built by Fairfield, Nov., 1917—Nov., 1918. Harwich Force 5th L.C.S. 1918-19; China 5th L.C.S. 1919-22.

CERES.—Built by Clydebank, April, 1916—June, 1917. Grand Fleet 6th L.C.S. 1917-19; Mediterranean 3rd L.C.S. 1919-22.

COLOMBO.—Built by Fairfield, Dec. 1917—June 1919. China 5th L.C.S. 1919-20; East Indies 4th L.C.S. 1921-22.

COVENTRY.—Built by Swan Hunter, Aug., 1916—Feb., 1918. Harwich Force 5th L.C.S. 1918-19; Atlantic Fleet 1st L.C.S. 1919; Flagship (D) 1920-22.

CURACOA.—Built by Pembroke Dockyard, July, 1916—Feb., 1918. Harwich Force 5th L.C.S. (flag) 1918-19 (mined in Baltic 1919); Atlantic Fleet 1st and 2nd L.C.S. (flag) 1919-22.

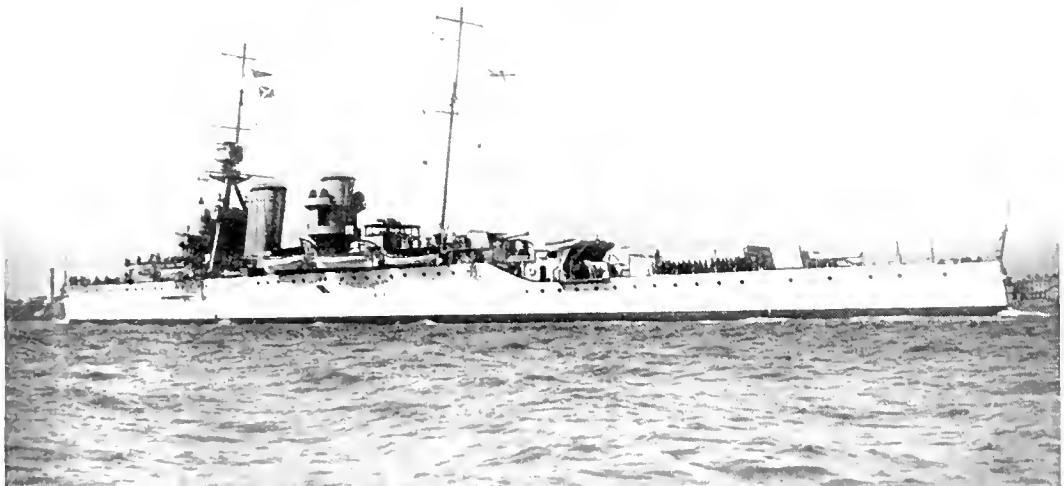
CURLEW.—Built by Vickers, Aug., 1916—Dec., 1917. Harwich Force 5th L.C.S. 1917-19; Atlantic Fleet 1st L.C.S. 1919; China 5th L.C.S. 1920-22; North America and West Indies 8th L.C.S., 1922.

" HAWKINS " class (3 ships) Emergency War Programmes

EFFINGHAM, FROBISHER, HAWKINS

Although nominally " light cruisers," the **" Hawkins "** class are cruising ships in the full sense of the term and should by rights come under this category. Officially known as **" Improved Birminghams "** they exhibit no family likeness to that class, but more or less represent the ultimate development of the " C " class within cruiser limits. Designed with a view to countering a class of large German light cruisers they were given a wide radius of action which would allow them to go raider hunting for extended periods, a much heavier armament than their quarry, and a high speed which could be maintained in a sea-way. Apart from this special metier they were fitted as cruiser squadron flagships, their heavier armament providing that re-enforcement against an occasional superiority in numbers or weight of metal which the enemy might possess. Although five of the class were laid down in 1916-17, their construction was never pressed ; **" Cavendish "** was completed as an air-craft carrier and re-named **" Vindictive,"** while the rest were regarded as stand-by ships and not finished off until after the Armistice. Their armament was finally decided upon after consideration of various combinations of 9.2, 7.5, and 6-inch guns and is undoubtedly the most effective yet mounted in a cruiser of 10,000 tons, the guns being semi-automatic, well distributed, and having a high elevation and extreme range. The wing guns amidships are mounted on platforms clear of inboard water in rough weather, while their shields are more spacious than the usual pattern. In common with recent practice, water-line bulges are fitted and it is reported that a better speed is obtained at load draught when these are practically submerged than when running light. It is worth noting that the **" Hawkins "** class are 15 feet longer than the **" Australia "** and 7 feet longer than the **" King George V "** and that, with the exception of certain Japanese light cruisers, they are the fastest ships of their category afloat.

Raleigh (*late*)



HAWKINS.

LIGHT CRUISERS

"HAWKINS" class (*continued*)

Dimensions.—605 × 65 × 20½ feet = 9,750 tons nominal and over 10,000 tons full load displacement.

Armament.—Seven 7.5-inch (these are disposed two on the quarterdeck separated by a couple of blast screens; one on the after shelter-deck; two abreast of the second funnel; one on the forward shelter deck and one on the forecastle). Six 12-pounders, four 3-inch A.A. and fourteen smaller guns. There are four above water and two submerged torpedo tubes.

Machinery.—Turbines of 60-70,000 H.P. = 30-31 knots. (**"Hawkins"** is lower powered and slower than the others). 4 screws. 12 Yarrow small tube boilers. Oil fuel = 1,500 tons, coal 800 tons.

Protection.—Side amidships is 3 inches, with 2 inches along the forecastle deck; for 150 feet fore and aft it is 2½-1½ inches. Upper deck is 1 inch thick.

Appearance.—Easily distinguishable from the rest of the light cruisers by the long forecastle, immense funnels, and tall main mast. The search-light towers on the second funnel detract a good deal from their symmetry.

EFFINGHAM.—Built at Portsmouth Dockyard, April, 1917—1922 (completing).

FROBISHER.—Built at Devonport Dockyard, Aug. 1916—1922 (completing).

HAWKINS.—Built at Chatham Dockyard, June, 1916—July, 1919. Flagship on the China Station. 5th L.C.S. To date.

(**RALEIGH.**—Wrecked off Labrador Coast, 1922.)

"DANAE" class (8 ships), War Emergency Programmes

DANAE, DAUNTLESS, DELHI, DESPATCH, DIOMEDE, DRAGON, DUNEDIN, DURBAN

These ships are developments of the **"Cardiff"** class in the same way that the **"Centaur"** is a modified **"Champion."** By lengthening the hull about 20 feet, an extra gun has been worked in between the mast and fore funnel—otherwise they follow the design of the **"Cardiff,"** excepting that the torpedo tubes are triple and differently spaced along the waist.

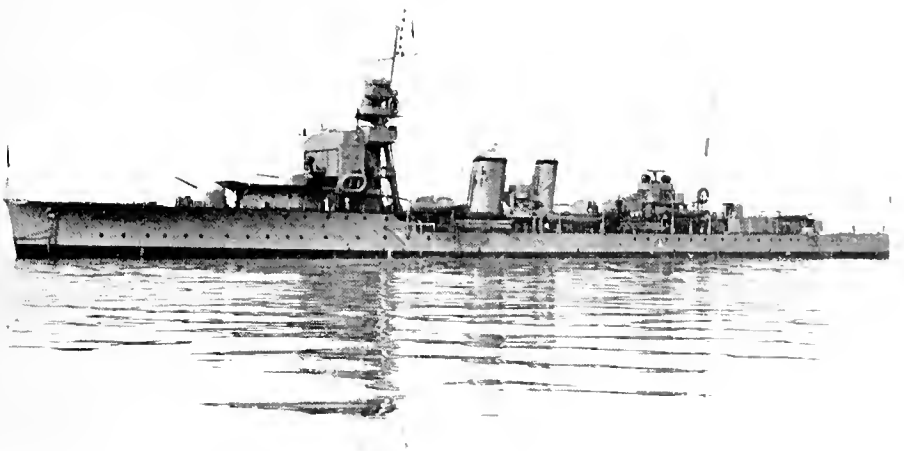
Dimensions.—472 × 46 × 16½ feet = about 4,760 tons nominal displacement.

Armament.—Six 6-inch along the centre-line, two 3-inch or 4-inch A.A. and sixteen smaller guns. Twelve torpedo tubes in four triple mountings. **"Diomede"** carries her foremost gun in a gun house and no blast screen is fitted to the shelter deck.

Machinery.—As in **"Cardiff"** class, but carry 1,050 tons oil fuel.

Protection.—As in **"Cardiff"** class.

Appearance.—**"Dragon"** and **"Dauntless"** have an aeroplane hangar in place of the usual bridge work forward; **"Dunedin," "Despatch," "Delhi,"** and **"Diomede"** have trawler bows and a revolving flying-off platform just forward of the s.l. position amidships. In general they are difficult to distinguish from the **"Cardiff"** class as the extra space between the mast and funnel is hard to pick up. Those fitted with hangars are especially unsightly ships, but all of them are too long, low, and asymmetrical for beauty.



DAUNTLESS
(*Note hangar replacing Charthouse*).

DIOMEDE.

(Note 4" and gunhouse and boats saving beneath aeroplane platform).

"DANAE" class (*continued*)

DANAE.—Built by Armstrongs, Sept., 1916—July, 1918. Served in the Harwich Force, 5th L.C.S. 1918-19; 1st L.C.S. Atlantic Fleet 1919-22.

DAUNTLESS.—Built by Palmers, Sept., 1916—Dec., 1918. Employed on detached service in the West Indies 1919; 1st L.C.S. Atlantic Fleet 1919-22.

DELHI.—Built by Armstrongs, Sept., 1917—June, 1919. Flagship of the 1st L.C.S. Atlantic Fleet 1919-22.

DESPATCH.—Commenced by Fairfield and towed to Chatham Dockyard for completion Mar., 1918—1922.

DIOMEDE.—Commenced by Vickers and towed to Portsmouth for completion Mar., 1918-22.

DRAGON.—Built by Scotts, Sept., 1916—Aug., 1918. Served in the 5th L.C.S. Harwich Force 1918-19; 1st L.C.S. Atlantic Fleet 1919-22.

DUNEDIN.—Built by Armstrong, Oct., 1917—Nov., 1919. 1st L.C.S. Atlantic Fleet to date.

DURBAN.—Built by Scott's and towed to Devonport Dockyard for completion Sept., 1917—Oct., 1919. China 5th L.C.S. 1919-22.

" EMERALD " class (2 ships), Emergency War Programme

EMERALD, ENTERPRISE

Whether the " E " class terminates a cycle of light cruisers design or not remains to be seen. A cross between the " D " class and the **" Hawkins,"** they represent that unhappy medium in which size will preclude numbers as their estimated cost is somewhere in the region of £1,350,000 apiece—or nearly half a million more than the " D " class. This, of course, is a big price to pay for an additional 6-inch gun and 3½-4 knots more speed, and the lessons of the past clearly show that the necessity for numbers will sooner or later demand a return to moderate dimensions—whether as purely gun-carrying ships or modified aircraft carriers remains to be seen. As it is, these vessels are the same length as the **" Hawkins "** and require 10,000 more H.P. than the **" Lion "** for their designed 33 knots. It will be seen that the unsightly trawler bow has been discarded in favour of a long sheer forward, the hull side being perpendicular for some feet before the flare commences.

Dimensions.—565 between perpendiculars and about 600 feet over all ; × 54½ (no bulges) × 18½ feet mean. = 7,600 tons nominal displacement.

Armament.—Seven 6-inch guns distributed as in the **" Hawkins "** excepting that the aftermost gun is brought up to the boat deck abaft the third funnel ; two 4-inch A.A. and sixteen smaller guns. Twelve torpedo tubes in four triple mountings are carried in the waist.

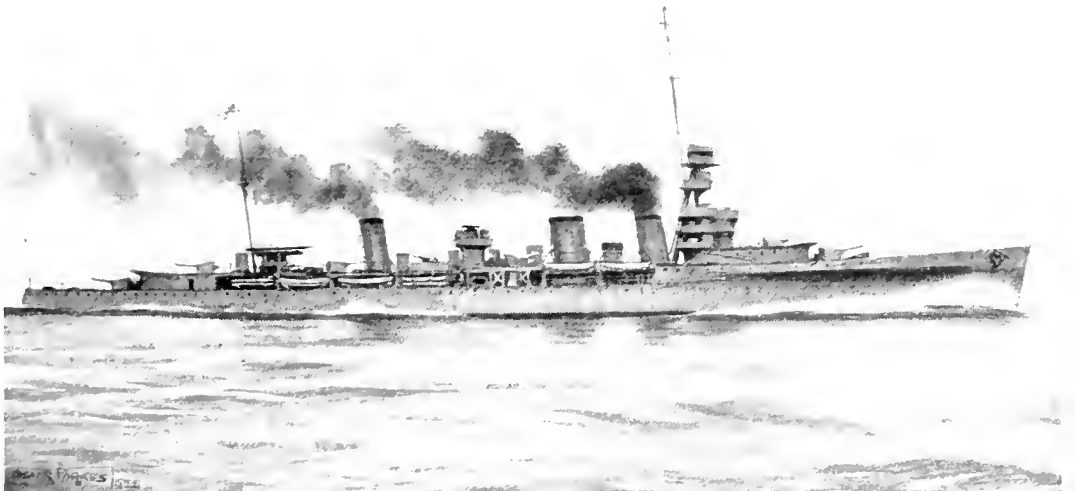
Machinery.—Turbines of 80,000 H.P. driving 4 screws = 33 knots at light and 32 knots at full load displacement. 8 Yarrow boilers. About 1,600 tons of oil fuel.

Protection.—As in the " D " class.

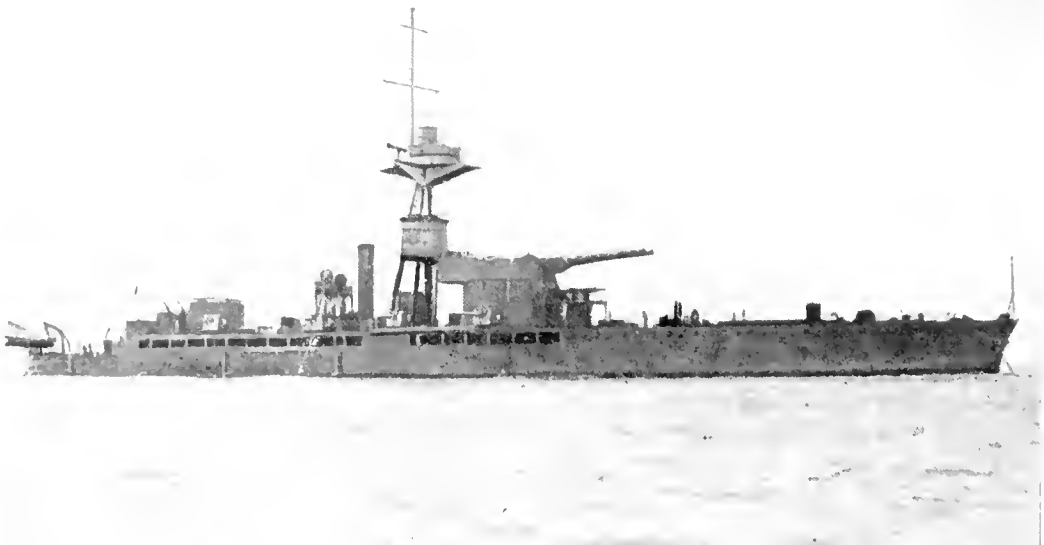
Appearance.—The widely spaced boiler rooms necessitate three funnels which give them a distinctive profile.

EMERALD.—Commenced by Armstrongs and completed at Chatham Dockyard, Sept., 1918—1922 or 1923.

ENTERPRISE.—Commenced at Clydebank and completed at Devonport Dockyard, June, 1918—1922 or 1923.



EMERALD



MARSHAL SOULT.

MONITORS

MARSHAL SOULT. (Emergency War Programme)

The operations off the Belgian Coast and projected Baltic Scheme made the need for additional ships suitable for bombarding purposes imperative, and in Nov., 1914 the **" Monitors "** were designed to Lord Fisher's specifications. The weak points of the low freeboard ships of the **" Mersey "** type taken over from Brazil in Aug. 1914 led to the adoption of a sea-going, high freeboard hull with a sufficiently light draft to permit of work closer inshore, which at the same time would reduce the risk of being struck by a torpedo. Whatever heavy guns were available were to be utilised, and sufficient engine power provided to enable the ships to proceed in and out of action. Altogether sixteen vessels were built, of which the first four (Abercrombie class) carried two 14-inch guns of American construction intended for a Greek battle-cruiser building in Germany ; the next batch of eight had a twin 12-inch gunned barbette lifted from the old **" Majestics "** put into them (Lord Clive class) and the remaining four were armed with 15-inch guns. Only three of these latter now remain in service, the remainder having been hulked or placed on the Disposals List.

The **" Marshal Soult "** was built at Palmers between Jan. and Nov. 1915, and is generally conceded to have been the most bizarre and ungainly looking warship which has ever flown the White Ensign. (Her sister the **" Marshal Ney "** proved a failure owing to unreliable engines and is now a hulk at Devonport). Her length is less than four times her beam owing to the 15 feet wide bulges which project beyond the hull proper which generally resembles an oblong box with rounded-off ends. Almost amidships is the twin 15-inch gunned turret mounted on a high barbette originally intended for the **" Barham,"** and heavy tripod mast supporting the chart house, big control tower, and director tower. Nowadays the funnel is twice its original height and the search-light platforms, after superstructure, and 4-inch guns have all been

MARSHALL SOULT (*continued*)

added since she was completed, so that her former grotesque profile has almost vanished. The bulges, carried up almost to the bluff, overhanging bow and round stern, are very different from the modified form now fitted to our capital ships. Instead of being filled with shock absorbing cylinders they are divided longitudinally into an outboard air space which is subdivided into about 50 compartments, and an inboard water space with vents above and below which impinges against the ship's side. A torpedo explosion therefore would expend itself on displacing the water in the outer part up, down, and inboard, the air cushion absorbing and localising the latter effects.

Dimensions.—355½ 90¼ × 10½ feet = 6,670 tons.

Armament.—Two 15-inch guns (high angle elevation) eight 4-inch, two 12-pounders, two 3-inch, and 2-pounder A.A. guns.

Machinery.—Two sets of Diesel engines driving 2 screws; designed H.P. = 1,500 = 6 knots. Fuel = 235 tons oil. Complement 228. Against a head wind the speed drops off quickly and steering becomes almost impossible.

Protection.—Barbette 8 inches; turret 13-4½ inches; 4-inch bulkheads fore and aft; 4-1 inches over magazine; vertical armour 4-6 inches.

The **SOULT** saw considerable service while attached to the Dover Patrol, her long range guns being of the greatest assistance when the 12-inch gunned monitors found themselves outranged by the German batteries. After the War she was attached to the Devonport command as gunnery ship which position she still fills.

EREBUS.

TERROR.

MONITORS "TERROR" class (2 ships), Emergency War Programme
EREBUS, TERROR

In these two ships the chief defect of the earlier monitors was overcome by giving them finer lines and increased horse power, with the result that although only designed for 12 knots they have proved capable of 14 knots in service. In every way they were most successful and quite the crack ships of the Dover Patrol. Although of the same general type as the **"Soult"** the blisters are not carried so far up to the extremities and they are 50 feet longer, while the addition of a bow rudder assists their steering.

As first completed they carried 12-pounders only as second armament, but two and then four 6-inch were afterwards added, and finally the present battery of 4-inch was substituted, while the conning tower at the base of the barbette was replaced by an A.A. gun platform.

Both ships were subjected to torpedo attack, the **"Terror"** having been hit three times on one occasion, two torpedoes getting her in the bows where considerable damage was done, and the third expended itself harmlessly on the bulge. The **"Erebus"** was attacked by a "distance controlled boat" carrying a very heavy charge which hit her full amidships, but the bulge completely protected the hull and she was on her station again in less than a fortnight.

Dimensions.—405 × 88 × 11 feet (mean) = 8,000 tons.

Armament.—Two 15-inch guns, eight 4-inch, two 12-pounders, two 3-inch A.A. and six smaller guns.

Machinery.—Two sets of triple expansion engines driving two screws. Babcock boilers. Designed H.P. 6,000 = 12 knots (14 in service). Fuel = 750 tons oil maximum. Complement 223.

Protection.—8 inches Barbette; 13-4½ inches turret; 4-inch bulkheads fore and aft; 4-inch citadel over magazine; 4½-6½ vertical armour.

Appearance.—Easily differentiated from the **"Soult"** by bow, bridge, and funnel. Both ships are very similar, but **"Erebus"** can usually be distinguished by the wide flange under the control top which is lacking in **"Terror."**

EREBUS.—Built by Harland and Wollf (Govan), Oct., 1915—Sept., 1916. Served on the Dover Patrol until the Armistice when she was sent to the Nore as gunnery school, in which capacity she is still serving.

TERROR.—Built by Harland and Wollf (Belfast), Oct., 1915—Aug., 1916. Served as above, and became gunnery school at Portsmouth 1918 to 1922. Now paid off.

AIRCRAFT CARRIERS

ARK ROYAL

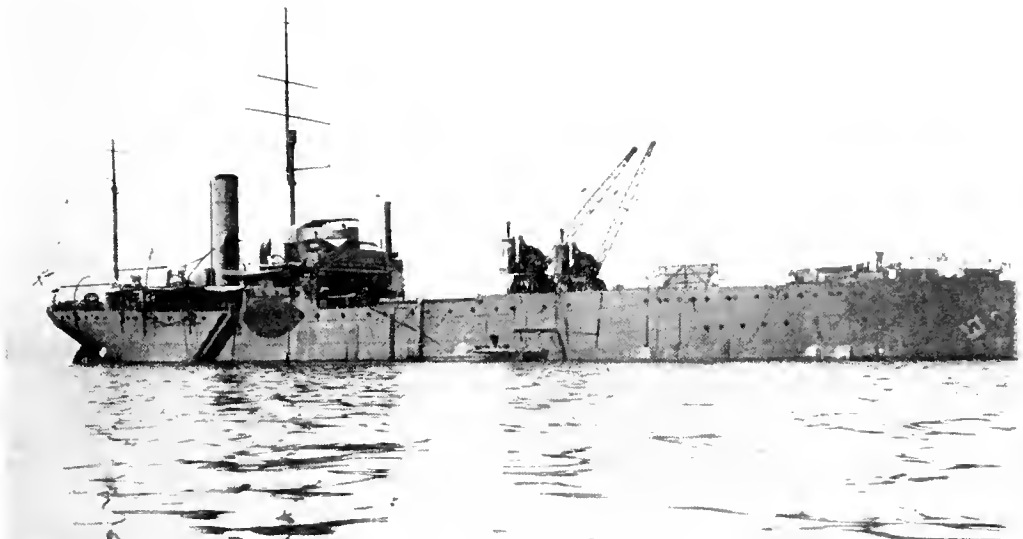
The Aircraft carrier was essentially a war-time production and without the stimulus of hostilities it is quite probable that its development as a distinct type of ship would still be in an elementary stage. As it was, when War broke out flight from shipboard was still in an experimental stage and sea-planes were the only aircraft employed. Temporary flying-off platforms had been rigged up along the forecastles of battleships from which sea-planes had been launched, but such were only peace-time improvisions; the only idea in the early days of the War was for the sea-plane to take-off from the water and the "carriers" were channel packets fitted with canvas hangars and derricks. A great step in the evolution of the "carrier" was the conversion of the **"Campania"** so that seaplanes could be flown from her forecastle, and at a later date when the aeroplane replaced these heavy and slow aircraft she underwent further modifications and finally emerged as our first "carrier" from which aeroplanes could be flown in 1916. No attempt was made to alight on the flight deck and returning machines had to take the water and be hoisted aboard if they were unable to make a landfall. It was not until the **"Furious"** underwent her second conversion that the "carrier" became an aerodrome in the full sense and the question of eddies from the funnels and upperworks which seriously affected alighting machines became one of the vital points which influenced the design of later ships, and led to the funnel-less **"Argus"** and side-funnelled **"Eagle"** and **"Hermes."**

Designed as an oil tanker and purchased while under construction at the Blythe S.B. Co. yard in 1914, the **"Ark Royal"** is the precursor of our present fleet of carriers, being the first ship to be so employed in the Navy. Owing to her low speed she was not intended to act with the sea-going forces, but as a sea-plane mobile base equipped with workshops and full facilities for repairing machines, besides accommodation for transporting machines. The sea-planes are hoisted in and out board by cranes and take-off from the water. During the War she performed invaluable service off Gallipoli and in the Eastern Mediterranean, and has since laid up in Reserve at Rosyth and the Nore.

Dimensions.—366 × 51 × 17½ feet (mean) = 7,080 tons displacement.

Armament.—Four 12-pounder and two machine guns.

Machinery.—Vertical triple expansion engines driving one screw = 3,000 H.P. = 11 knots. Cylindrical boilers. Oil = 500 tons. Complement 130 + R.A.F.



ARK ROYAL.

PEGASUS

"PEGASUS" (purchased 1917)

During the war a number of cross-channel and railway packets were taken over by the Admiralty and converted into aircraft carriers, being fitted out with hangars aft and in some cases flying-off platforms forward as well. Having a good turn of speed they were well suited for the work, but with the termination of hostilities all with the exception of the "**Pegasus**" were re-conditioned and returned to their pre-war work. This ship was built at Clydebank as the G.E.R. "**Stockholm**" and purchased for the Navy in 1917; for use as a "carrier" she was fitted with a flying-off platform forward and a hangar aft and was commissioned for service in the Grand Fleet Flying Squadron in the same year. During 1919 she was transferred to the White Sea and has subsequently served in the Mediterranean.

Dimensions.—332 × 43 × 15½ feet = 3,070 tons displacement.

Armament.—Two 3-inch and two 12-pounder A.A. guns.

Machinery.—Geared turbines driving 2 screws = 9,500 H.P. = 20¼ knots. Cylindrical boilers. Oil fuel = 360 tons. Complement 280 + R.A.F.

AIRORAFT CARRIERS "FURIOUS" (Emergency War Programme)

Built at Armstrongs as the third of the **"Courageous"** trio, but designed to carry two 18-inch instead of four 15-inch guns, and 5.5-inch in place of 4-inch guns as a secondary armament, the **"Furious"** was on the point of completion when it was decided to convert her into an air-craft carrier. As a cruiser her value at the best was problematical; as a carrier she possessed the size, speed, and deck accommodation which experience with smaller and slower ships had shown to be necessary. As at first converted, the alterations were confined to the forward section only, the turret being removed and a large hangar and flying-off platform were built on to the forecastle. Experiments having demonstrated the danger in attempting to alight on this platform, she was taken in hand in Nov. 1917 for further alterations and re-appeared in Mar. 1918 as a carrier pure and simple. The after turret was replaced by a second hangar, and an alighting deck was built from the funnel to the end of the hangar some 75 feet short of the stern. This entailed the removal of the main mast, and a redistribution of the 5.5-inch guns on the broadside, the appearance of the ship being completely altered. She had now accommodation for twenty aeroplanes, which could be raised by electric lifts from the hangars and flown off in three minutes apiece, while the after deck could be used for landing Blimps.

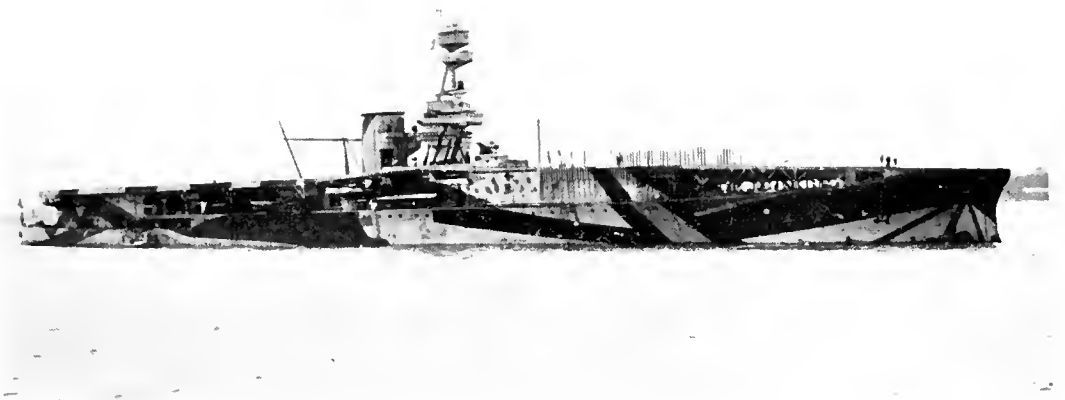
Although now a successful floating aerodrome, the air eddies caused by the funnel and upper work still tended to make alighting a difficult operation when the ship was under weigh, and she was therefore put out of commission for further transformation in 1921-23 on the completion of which she will present an entirely different profile. The funnel has been removed and the furnace exhaust is now led out at the sides, while the mast and superstructure have vanished. A hangar replaces the flying-off deck forward of which only a short section remains, and the roof of this hangar will serve as a take-off for the machines.

Dimensions.—786½ × 88 (outside bulges) × 25 feet (maximum) = 22,900 tons full load displ.

Armament.—Ten 5.5-inch; five 3-inch A.A. and two 3-pounder guns. 16 above water and 2 submerged tubes.

Machinery.—All-geared turbines driving four screws = 90,000 H.P. = 31 knots. In service she has done 32-33 knots. Oil = 3,393 tons. Complement 820 R.N. plus R.A.F. **Protection.**—As in **"Courageous."**

FURIOUS.—Built at Elswick, June, 1915—July, 1917. She served in the Grand Fleet 3rd L.C.S. 1917 and Flying Squadron 1918-19; Atlantic Fleet 1919; in Reserve at Rosyth 1920, since when she has been undergoing alterations there and at Devonport.



FURIOUS (*taken in* 1918).

VINDICTIVE.

"VINDICTIVE" (Emergency War Programme)

Originally a sister to the light cruiser **"Hawkins,"** the **"Cavendish"**—as she was then calwasled—laid down at Harland and Wolff's, Belfast, in June 1916, converted into a carrier at an early stage of construction, and completed in Oct. 1918 as **"Vindictive."** As may be seen by comparing her with the **"Hawkins,"** the alterations effected include the addition of a flying-off deck aft, some conversion between decks, and suppression of some of the main armament. The forward shelter deck has become a flying-off deck with wind-breaking pallisades and derricks, and a stopping net is slung from davits just abaft the range-finder platform amidships. Her special duty was to act as an alighting ship for the aeroplanes flown from other ships, and she was intended to operate with the light cruisers—hence the high speed required. As she was only finished off just before the Armistice she had no opportunity of proving her worth; during the Baltic operations in July 1919, she unfortunately ran aground and had to undergo a long re-fit 1920-21. She has since been stationed at Portsmouth and employed on "trooping" duties to the Mediterranean.

Dimensions.—606 × 65 (outside bulges) × 20½ feet = 9,750 tons displacement.

Armament.—Four 7.5-inch, four 12-pounders, four 3-inch A.A. and eight smaller guns. Four submerged and two above water torpedo tubes.

Machinery.—Turbines of 60,000 H.P. driving four screws = 30 knots. Fuel = 800 tons coal and 1,420 tons oil. Yarrow boilers. Complement 730.

Protection.—As in **"Hawkins."**

AIRCRAFT CARRIERS

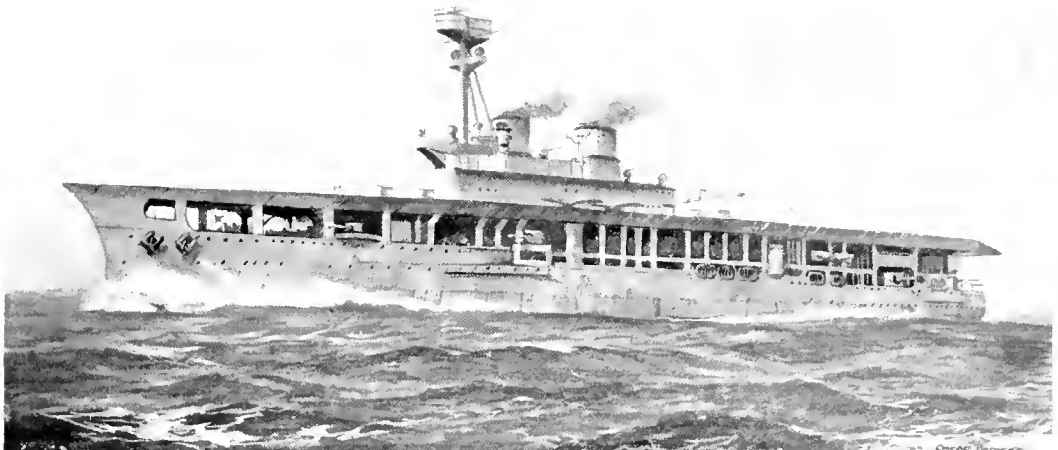
" EAGLE " (1913—1922)

Designed and laid down at Elswick in 1913 for Chili as the battleship **" Almirante Cochrane "** a sister to the **" Canada "** (now **" Almirante Latorre "**) she lay on the stocks until 1917 when negotiations were effected for her purchase and conversion into a carrier. Although completed for preliminary trials in April 1920, she has been in hand at Portsmouth ever since for alterations which are to be finished during 1922. She is the biggest carrier in existence and a unique ship in every way. Her battleship hull—which is fitted with bulges—rides light and high out of water and is surmounted by a full length flying deck beneath which are the hangars and workshops. Amidships and over to the extreme starboard is a long narrow superstructure fitted with a navigating bridge and enclosing the funnel uptakes ; the deck is thus left clear and there is ample flying-off and alighting space uninfluenced by air eddies. Recent alterations include the fitting of a tripod mast and an additional funnel.

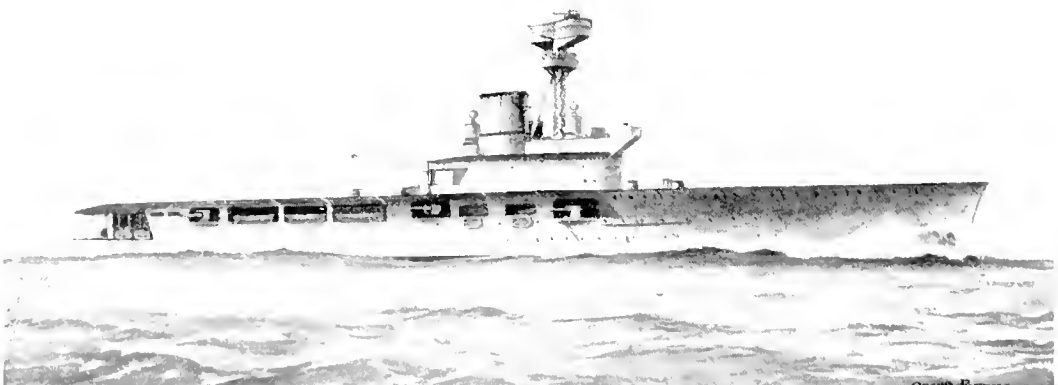
Dimensions.—661 × 104 (outside bulges) × 27 feet = 22,790 tons nominal and 26,200 tons full load displacement.

Armament.—Nine 6-inch, six 4-inch A.A. and four smaller guns ; the number of torpedo tubes is not published.

Machinery.—Geared turbines of 55,000 H.P. = 24 knots. Fuel = 3,200 tons of coal and 1,750 tons of oil.



EAGLE. *From a drawing by Oscar Parkes.*



HERMES. *From a drawing by Oscar Parkes.*

" HERMES " (Emergency War Programme)

Is the first ship to be specially designed by the Admiralty as an aircraft carrier, and was launched at Elswick in 1919 and then towed to Portsmouth for completion. In general design she is a smaller edition of the **" Argus,"** but has a funnel and a small superstructure on the starboard side amidships, and a tripod mast. She is fitted with two hangars and will carry about 20 machines which can be raised to the flying-off deck on electric lifts. As her particulars are still confidential it will suffice to say that she will be fitted with new types of gear for landing, handling, and flying-off aircraft, considerably in advance of that hitherto employed. Her speed of 25 knots is on the slow side for modern carriers and it is not likely to be much exceeded in Service. Especial interest is afforded by the **" Hermes "** inasmuch as she represents the medium sized carrier compared with the **" Eagle "** and **" Pegasus,"** and although at one time the demand was all for size in these ships it is now realised that the extreme vulnerability of the flying decks makes it very questionable whether the gigantic carriers are not a mistake. Once a bomb has holed a flight deck, flying off and alighting will become a matter of extreme difficulty and danger—so much so that the ship may be virtually out of action it the damage is extensive, and a hit from a heavy bomb or shell is not going to have very localised results. For this reason the Admiralty decision to experiment with a smaller type of ship was to be commended, and it is more than likely that three 10,000 ton ships like **" Hermes "** might be of better value than a 30,000 tonner such as has been contemplated abroad. At present this country is so far ahead of the other Powers in the knowledge and design of carriers that our examples in **" Hermes "** may be extensively copied now that the question of size is becoming regarded as not altogether an unmixed blessing.

Dimensions.—594½ × 70 × 18¾ (mean) feet = 10,950 tons displacement.
Armament.—Seven 6-inch, four 4-inch, A.A. and nine smaller guns. Torpedo armament not known.
Machinery.—Geared turbines driving two screws = 40,000 H.P. = 25 knots. Oil fuel = 2,000 tons.

AIRCRAFT CARRIERS

"ARGUS" (Emergency War Programme)

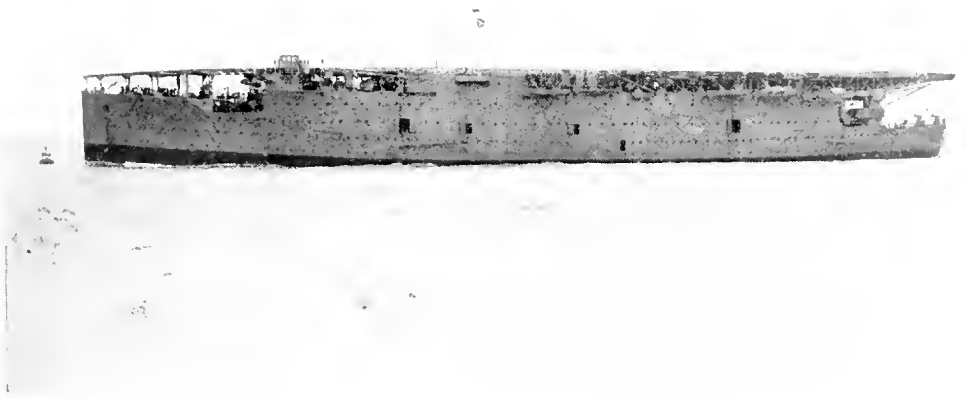
Begun by Beardmore as the Italian liner **"Conte Rosso"** in 1914, she was purchased for the Navy in 1916, and completed as an aircraft carrier in 1918. In view of the difficulties experienced in landing on the deck of the **"Furious"** due to the air eddies caused by the hot furnace gases from the funnel and displacement currents from the upper-works, the **"Argus"** was designed with a perfectly clear flying deck from stem to stern and the furnace smoke and gases were expelled by fans through big horizontal smoke ducts opening out aft. Her chart house is raised and lowered on a lift and the two light wireless masts are hinged to fall flush with the deck. Twenty aeroplanes can be stowed in the hangar which is divided into four sections by fire-proof screens, and communicates with the flying deck by means of two lifts. Amidships are wind-breaking pallisades which can be raised to protect machines on deck, and two derricks are fitted amidships and two cranes aft for lifting aircraft from the water. The hull contains large carpenters' and engineers' workships, fully equipped for the maintenance and repair of aircraft; torpedoes and bombs for the aeroplanes are stored so that she is fitted in every way as a floating hangar and aerodrome, and as such has proved very successful.

Dimensions.—565 × 68 × 21 feet (mean) = 14,450 tons displacement.

Armament.—Two 4-inch; four 4-inch A.A. No torpedo tubes.

Machinery.—Turbines of 22,000 H.P. driving four screws = 20½ knots. Twelve boilers. Fuel = 2,000 tons oil. Complement 360 R.N. plus R.A.F.

Appearance.—Differs from all the other carriers in having no funnels or mast.



Argus.

YARRA.

DESTROYERS

" PARRAMATTA " type (6 boats) 1909—1916

PARRAMATTA, YARRA, WARREGO, HUON, SWAN, TORRENS

(Royal Australian Navy)

These boats, which were specially built for the Australian Navy, are modified editions of the " I " class of destroyers and belong to a type which is now obsolete. **" Yarra "** was built by Denny (1910) and **" Parramatta "** and **" Warrego "** by Fairfield, the latter being re-erected at Sydney. The remaining three boats were all built at Sydney 1914-16.

Dimensions.—$250\frac{3}{4}$ (average) $\times$ $24\frac{1}{2}$ $\times$ 8 feet = 700 tons displacement.

Armament.—One 4-inch ; three 12-pounders ; 1 Machine and four Lewis guns. Three 18-inch torpedo tubes.

Machinery.—Turbines of 11,300 H.P. = 26 knots. Yarrow boilers. Oil 178/189 tons. Complement 70.

Appearance.—Very much like our old **" River "** class with two short funnels of equal height, which together with the absence of sheer to the forecastle mainly distinguishes them from the **" Admiralty S "** destroyers in Australian waters.

"ADMIRALTY "R" class" (34 boats), Emergency War Programme. 1915-17

These boats belong to the standard design to which the bulk of the destroyers were built during the War. All have seen hard service and are now in Reserve or attached to Training Establishments, with the exception of **"Telemachus"** which is a mine-layer working with the Atlantic Fleet.

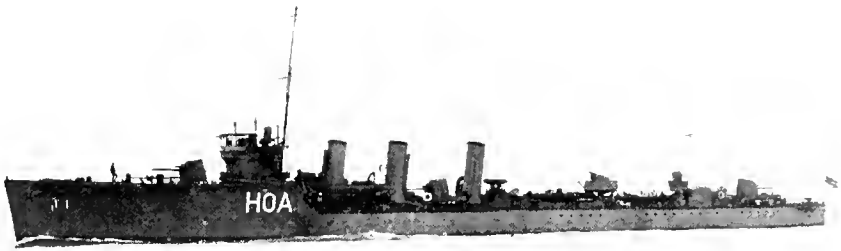
3 Beardmore—**SATYR, SHARPSHOOTER*, TANCRED.**
7 Clydebank—**RESTLESS, RIGOROUS, ROMOLA, ROWENA, SKATE, TARPON*, TELEMACHUS†*.**
3 Denny—**ROB ROY, ROCKET, RED GAUNTLET.**
1 Doxford—**REDOUBT.**
1 Fairfield—**TEMPEST.**
6 Harland and Woollf—**SALMON, SKILFUL, SPRINGBOK, SYLPH, TENACIOUS, TETRACH.**
5 Hawthorn Leslie—**SARPEDON, STORK, STARFISH, THISBE, THRUSTER.**
3 Stephen—**SCEPTRE, STURGEON, TORMENTOR.**
4 Swan Hunter—**RADSTOCK, RAIDER, SORCERESS, TORRID.**
1 White—**SABLE*.**

Dimensions.—275 × 26¾ × 15 feet = 1,065 tons (average).

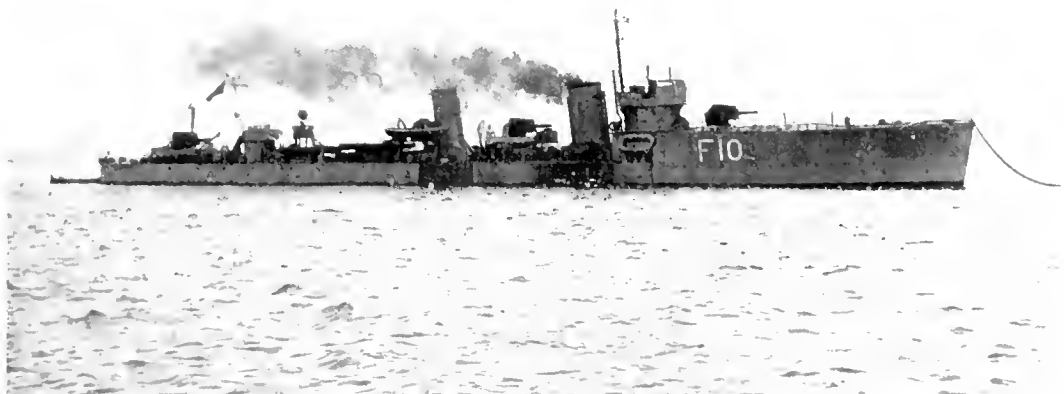
Armament.—Three 4-inch; one 2-pounder Pom pom; five smaller guns. Two pairs of 21-inch torpedo tubes (*Two 4 inch only. †One pair of tubes).

Machinery.—Turbines of 27,000 H.P. = 36 knots. Two screws. 3 Yarrow boilers excepting **"Sable"** (White—Forster). Oil = 243/301 tons. Complement 90.

Appearance.—Three small round unevenly spaced funnels of the same height. **"Satyr," "Skate," "Starfish," "Stork"** and **"Telemachus"** have a tall mainmast.



Rob Roy



URSS

DESTROYERS

"Admiralty Modified " R " class " (8 boats), Emergency War Programmes, 1916-17

In this class, a development of the " R " type, increased sea-going qualities have been secured by lengthening the forecastle and including certain Yarrow features in the design. On the whole they are not quite so fast as the previous classes.

TOWER (Swan Hunter), **TRENCHANT** (White), **ULSTER** (Beardmore), **UMPIRE** (Doxford), **UNDINE** (Fairfield), **URCHIN URSA** (Palmer), **URSULA** (Scott).

Dimensions.—276 × 26¾ × 11¾ feet = 1,085 tons nominal and 1,240 tons deep load draught.

Armament.—As in previous classes.

Machinery.—Geared turbines of 27,000 H.P. = 36 knots. Two screws. 3 Yarrow boilers except in **" Trenchant "** (White Forster). Oil = 250/300 tons. Complement 90.

Appearance.—The long forecastle, proximity of bridge and funnel, and flat stern, distinguish them from the Yarrow boats. Also, the after gun in on a stand, and there are various minor differences in the deck structures—position of boats, s.l. and A.A. gun platforms, etc.

Yarrow " M " class (6 boats), War Emergency Programmes, 1915-16
RELENTLESS, RIVAL, SABRINA, SYBILLE, TRUCULENT, TYRANT

These are Yarrow adaptations of the **" Admiralty "** design and owing to the different arrangement of the boiler rooms have only two funnels. Also, for certain constructional reasons, they come out at about 130 tons lighter on the nominal displacement than the standard type. Not having the after gun on a " band-stand " and being fitted with direct drive instead of geared turbines they should be regarded as survivals of an earlier class of boat of which the " standard " Admiralty units have now been scrapped ; but as all made from 36 to 39 knots on trials their speed has justified their retention.

Dimensions.—271 × 25¾ × 10½ feet = 897 to 923 tons nominal and up to 1,050 tons trial displacement.

Armament.—As in **" Admiralty "** design.

Machinery.—Turbines of 23,000 H.P. = 36 knots. Two screws. 3 Yarrow boilers. Oil = 202 to 256 tons. Complement 90.

Appearance.—Easily distinguished by their two unequal-sized funnels of the same height and well distanced from the bridge, and typical Yarrow overhanging stern. **" Rival "** is used for instructional purposes and carries no torpedo tubes.

" Thornycroft " R " class " (8 boats) War Emergency Programmes, 1915-17
RAPID, READY, RETRIEVER, ROSALIND, TAURUS, TEAZER, PATRIOT, PATRICIAN

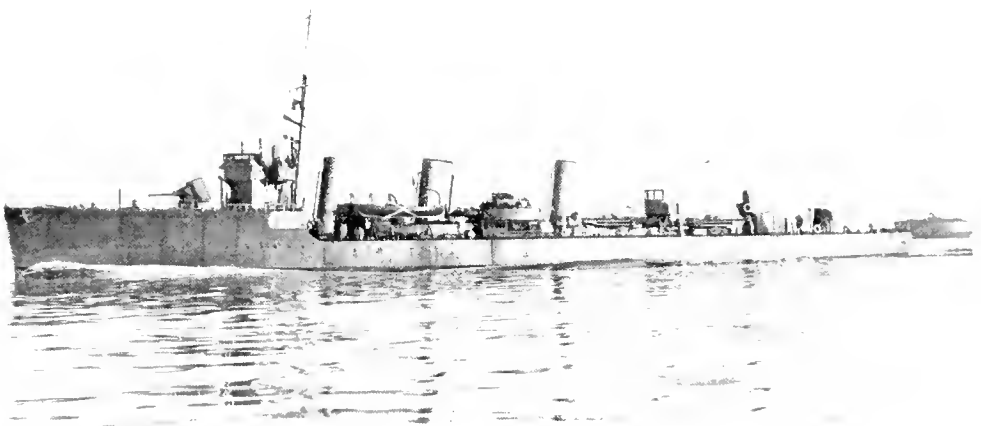
Built between 1915 and 1917 this class includes some of the fastest boats in the Service. In general design they follow the **" Admiralty "** design but have the typical **" Thornycroft "** appearance. The two last boats have been transferred to the Royal Canadian Navy and belong to an earlier batch which are without the " band-stand " for the after gun.

Dimensions.—274 × 27½ × 11 feet = 1,035 tons displacement.

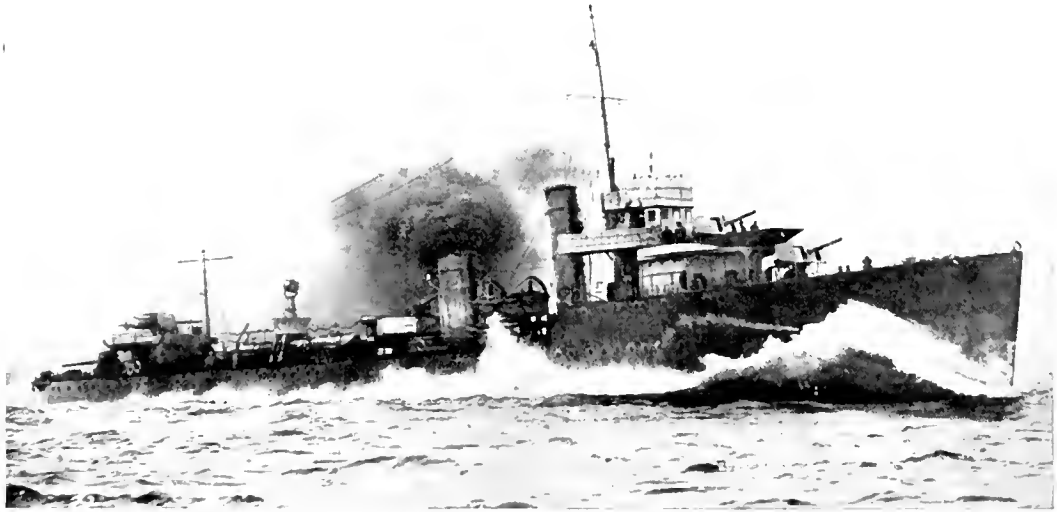
Armament.—As in **" Admiralty "** design.

Machinery.—Turbines (geared excepting in first four) = 27,500/29,000 H.P. = 35 knots. 4 Yarrow boilers. Oil = 220/285 tons. **" Teazer "** on trials made 40.2 knots.

Appearance.—Have three almost equally-spaced oval funnels of the same height, the middle being wider than the others.



RAPID (*Thornycroft "R" class*).



VIMIERA.

DESTROYERS "V" and "W" classes, Emergency War Programmes, 1916-18

The system of super-firing guns, introduced into destroyer design in the **"Seymour"** class of Leader, was developed in these boats endowing them with a high gun command and concentration of fire which makes them unique amongst the world's torpedo craft. It will be seen that the general principle of gun distribution corresponds with that of the 13.5-inch gunned battleships and the **"Cardiff"** class of light cruisers—i.e., two positions fore and aft and one amidships; that this is the best possible spacing is generally conceded but it certainly seemed a drastic step to adopt it for destroyers and place weights at such a height above the water-line. However, the "**V**" and "**W**" classes are an unqualified success and the most efficient destroyers afloat. Originally the "**V**" class had four tubes and were thus differentiated from the "**W**"s which have six, but ten of them have since had their twin positions converted into triples so that the former class distinction no longer exists. There are, however, differences which to make sub-classification advisable, the boats of both classes being grouped together by appearance or armament.

ADMIRALTY TYPE (39 Boats).

(1) **VANOC VANQUISHER** (Clydebank), **VENTUROUS** (Denny).

Represent the original Admiralty "**V**" type. They have four torpedo tubes in two twin mountings and still retain their mine rails and chutes at the stern.

(2) **VANCOUVER** (Beardmore), **VELOX** (Doxford), **VENETIA** (Fairfield), **VERSATILE** (Hawthorn Leslie), **VESPER** (Stephen) **VIVACIOUS** (Yarrow), **VORTIGERN** (White).

Have or will have five tubes in one triple and one twin mounting. Have been mine layers and retain their stern chutes. The extra tube in the forward group makes them distinctive.

(3) **VANESSA VANITY** (Beardmore), **VEGA** (Doxford), **VENDETTA** (Fairfield), **VERDUN** (Hawthorn Leslie), **VIDETTE** (Stephen), **VIOLANT VIMIERA** (Swan Hunter), **VECTIS** (White), **VIVIEN** (Yarrow), **VOYAGER** (Stephen), **WAKEFUL WATCHMAN** (Beardmore), **WALKER WESTCOTT** (Denny), **WALPOLE WHITLEY** (Doxford), **WALRUS WOLFHOUND** (Fairfield), **WARWICK WESSEX** (Hawthorn Leslie), **WATERHEN WRYNECK** (Palmer), **WESTMINSTER WINDSOR** (Scott), **WHIRLWIND WRESTLER** (Swan Hunter), **WINCHESTER WINCHELSEA** (White).

All have or will have six tubes in two triple mountings.

ADMIRALTY TYPE *(continued)*

Dimensions.—312 × 29½ × 11½ (maximum) = 1,272/1,339 tons displacement.

Armament.—Four 4-inch and one 3-inch A.A. guns; torpedo tubes as noted.

Machinery.—All geared turbines driving two screws = 27,000 H.P. = 34 knots at light load, 31 knots at deep load. 3 Yarrow boilers except White boats which have White Forster boilers. Oil = 322/368 tons. Complement 110.

Appearance.—All these boats have a characteristic profile and are easily distinguished from previous types by their unequal funnels, the foremost being thin and tall and the after one short and fat and the shelter decks fore and aft upon which the superfiring guns are mounted. Abaft the second funnel is the A.A. gun, then the two sets of tubes with a search-light in between, and a small w.t. mast forward of the after shelter deck.

"Thornycroft "V" and "W" classes" (4 Boats)

VICEROY, VISCOUNT, WOLSEY, WOOLSTON (Emergency War Programme) 1916-18

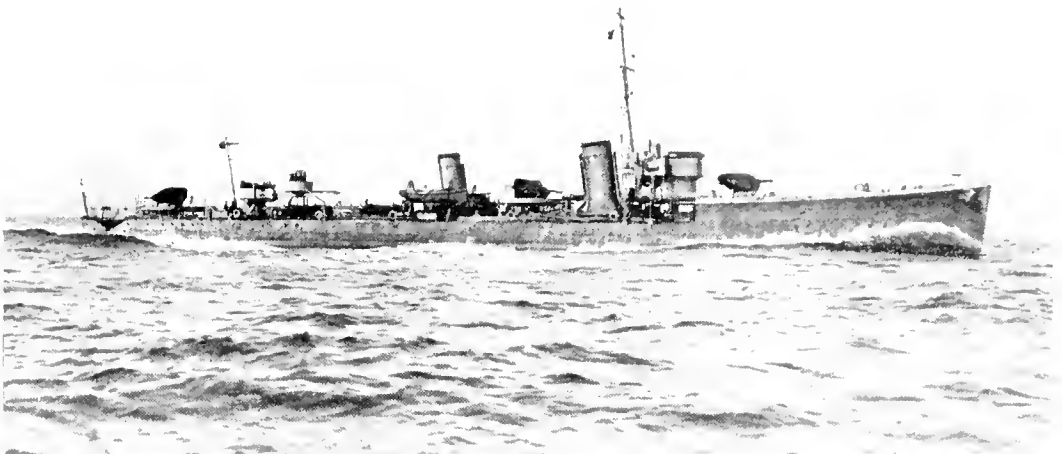
These boats differ from the preceding classes in appearance and dimensions, but otherwise belong to the same general type. Owing to their increased power they are slightly faster.

Dimensions.—312 × 30½ × 11¾ feet (maximum) = 1,325 tons displacement.

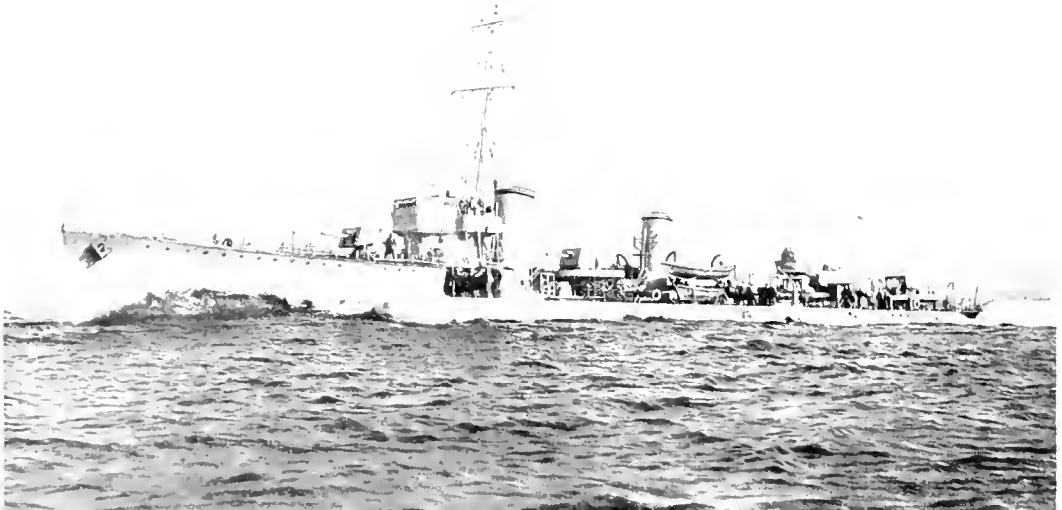
Armament.—As in **"Admiralty"** design.

Machinery.—Geared turbines driving 2 screws = 30,000 H.P. = 35 knots at light load and 31 knots at full load (1,512 tons). Oil = 322/374 tons. Complement 110.

Appearance.—After funnel is taller than in the Admiralty **"V"** and **"W"** boats, and flat sided.



Shamrock (*see page* 125).



DESTROYERS

"Admiralty "S" class" (54 boats), Emergency War Programme 1917 and later Estimates

In general design these are **"Modified R"** boats with a marked sheer forward and a slight turtle deck to the forecastle, and originally carried additional tubes at the break of the forecastle. The "improvements" as such have not been altogether a success, as they have a reputation for being very wet and the shape of the forecastle tends to throw a lot of water inboard and over the bridge in a seaway. The extra tubes were 18-inch pattern and intended for use against enemy destroyers at close range, but were found to detract from the weatherly qualities to such an extent that they have been removed in all excepting three boats. On trials several of the class developed remarkable speeds and all are good for 35-36 knots.

3 Stephen—**SABRE, SALADIN, SARDONYX.**
9 Clydebank—**SCIMITAR, SCOTSMAN, SCOUT, SCYTHE, SEABEAR, SEAFIRE, SEARCHER, SEAWOLF, SIMOOM.**
6 Denny—**SENATOR, SEPOY, SERAPH, SERAPIS, SERENE, SESAME.**
3 Doxford—**SHAMROCK, SHIKARI** (completed at Chatham Dockyard), ***SUCCESS.**
7 Swan Hunter—**SHARK, SPARROWHAWK, SPLENDID, SPORTIVE, *STALWART, TILBURY, TINTAGEL.**
5 Fairfield—**SIKH, SIRDAR, SOMME, SPEAR, SPINDRIFT.**
3 Palmer—**STEADFAST, STERLING, STORMCLOUD.**
5 Scott—**STRENUOUS, STRONGHOLD, STURDY, SWALLOW, *SWORDSMAN.**
4 Beardmore—**TACTICIAN, TARA, *TASMANIA, *TATTOO.**
4 Hawthorn Leslie—**TENEDOS, THANET, THRACIAN** (completed at Sheerness Dockyard), **TURBULENT.**
5 White—**TRIBUNE, TRINIDAD, TROJAN, TRUANT, TRUSTY.**

Dimensions.—276 × 26¾ × 11 feet (mean) = 1,075 tons displacement.

Armament.—Three 4-inch; one 2-pounder pom-pom; one Machine and four Lewis guns. Four 21-inch torpedo tubes in pairs amidships. **"Tintagel," "Trojan," "Tara"** and **"Tactician"** retain the two 18-inch tubes forward at the break of the forecastle. **"Tara"** has after gun removed.

Machinery.—Geared turbines driving two screws = 27,000 H.P. = 36 knots. 3 Yarrow boilers except in the White boats which have White Forster boilers. Oil = 254/301 tons. Complement 90.

Appearance.—Differ from the **"R"** class by the sheer forward and unequal height of funnels.

Boats marked with an asterisk * were presented to the Royal Australian Navy in 1919.

DESTROYERS

"Thornycroft "S" class" (4 boats), Emergency War Programme 1917-18

TOBAGO, TORBAY, TOREADOR, TOURMALINE

Belong to the same general type as the **"Admiralty"** boats but differ in dimensions, power, and appearance.

Dimensions.—$275\frac{3}{4} \times 27\frac{1}{2} \times 10\frac{1}{2}$ feet (mean) = 1,087 tons displacement.

Armament.—As in **"Admiralty"** type.

Machinery.—Geared turbines driving 2 screws = 29,000 H.P. = 36 knots. All exceeded their designed speed on trials.

Appearance.—Forecastle gun is raised on a "band-stand" and the funnels are of the same height with slightly less rake than in the **"Admiralty"** and **"Yarrow"** types.

SPEEDY sunk by collision in the Sea of Marmora, Sept. 24, 1922.

TOREADOR.

Turquoise.

" Yarrow " S " class " (6 boats), Emergency War Programme 1917-18

TOMAHAWK, TORCH, TUMULT, TURQUOISE, TUSCAN, TYRIAN

In conformity with **" Yarrow "** practice, these boats are constructionally lighter than the rest of the class, are very slightly smaller, and with a considerable reduction in power have proved the fastest on trials by a good margin.

Dimensions.—$273\frac{1}{2} \times 25\frac{3}{4} \times 10$ feet (mean) = 930 tons displacement.

Armament.—As in **" Admiralty "** type.

Machinery.—Direct drive turbines = 23,000 H.P. = 36 knots. On trials at 1,060 tons load **" Torch "** and **" Turquoise "** both exceeded 39 knots and **" Tyrian "** reached 39.7. Yarrow boilers. Oil = 215/256 tons. Complement 90.

Appearance.—Have a somewhat thicker fore funnel than the rest of the class, and the typical Yarrow sloping stern.

DESTROYERS

"Admiralty Modified "W" class" (14 boats), Emergency War Programme 1918 and subsequent Estimates

This batch are practically identical with the earlier **"W"** class, but armed with 4.7-inch instead of 4-inch guns. In all, 52 boats of the "modified W" type were ordered, but 38 were cancelled after the Armistice. Those completed can be divided into two classes :—

(1) **VETERAN** (Clydebank), **WHITSHED, WILD SWAN** (Swan Hunter), **WITHERINGTON, WIVERN, WOLVERINE, WORCESTER** (White),

which have a thick fore funnel and two A.A. guns between the funnels and :—

(2) **VANSITTART** (Beardmore), **VENOMOUS, VERITY** (Clydebank), **VOLUNTEER** (Denny), **WANDERER** (Fairfield), **WHITEHALL** (Swan Hunter), completed at Chatham Dockyard, **WREN** (Yarrow) completed at Pembroke Dockyard,

which are funnelled like the Admiralty **"W"s** and have the A.A. guns abaft the second funnel.

Dimensions.—312 × 29½ × 11 feet (mean) = 1,325 tons nominal and 1,500 tons full load displacement.

Armament.—Four 4.7-inch ; two 2-pounder pom-poms ; one Machine and four Lewis guns. Six 21-inch tubes in two triple mountings.

Machinery.—As in earlier **"W"** class.

Appearance.—Differences as noted above.

"Thornycroft "Improved W" type" (2 boats), Emergency War Programme

WISHART, WITCH

Both completed at Devonport Dockyard. They differ from the **"Admiralty"** type in dimensions, H.P., and speed, and have big flat-sided funnels of almost the same height.

Dimensions.—312 × 30½ × 11 feet (mean) = 1,345/1,550 tons displacement.

Machinery.—All-geared turbines driving 2 screws = 30,000 H.P. = 35 knots at light, and 32 knots at full load. Oil = 374/324 tons.

WHITSHED.
(*Class I. Note big fore funnel*).

WANDERER
(Class II — Note thin low funnel)

WISHART.
(*Thornycroft Type* 2. *Note tall funnels*).

Nimrod

FLOTILLA LEADERS

"NIMROD" (1914-15 Estimates) built by Denny 1914-15

"ABDIEL" (Emergency War Programme) built by Cammell-Laird 1915-16

Excepting for the "**Swift**" and the big destroyers of the "**Tribal**" class we had no flotilla leaders in service in 1914. The senior officer's flag was usually carried in one of the "**Scouts**" as being the only ships more or less suitable for the duties entailed, but as a class the "**Scouts**" were on the slow side, and could not have led a full speed dash by many knots. The necessity for having a larger and more powerful ship as "leader" is twofold. For one thing extra accommodation is required for the staff, and secondly the leader must be able to act as a spear-head or re-inforcement with sufficiently superior gunpower to overcome any likely destroyer opponent. The 1913-14 programme allowed for the construction of special boats which embodied the necessary requirements for the duties of "leader," i.e. speed equal to that of the rest of the flotilla, a heavy armament, adequate accommodation on the bridge and below for the S.O., staff and additional ratings (signalmen, etc.) and a wide radius of action. Since then the type has undergone marked development in every respect. The "**Abdiel**" and "**Nimrod**" belong to a group of seven boats completed between 1915-16 of which the remainder have been stricken from the Navy list. The design is more or less an enlarged edition of the contemporary destroyers of the "**M**" type with an extra 4-inch gun amidships.

Dimensions.—325 × 31¾ × 11¾ feet = 1,608/1,860 deep load displacement.

Armament.—Four 4-inch; one 3-inch A.A.; one 2-pounder pom-pom disposed along the centre-line. Four 21-inch tubes in pairs amidships.

Machinery.—Turbines (geared cruising) driving 3 screws = 36,000 H.P. = 34 knots. Yarrow boilers. Oil 408/506 tons. Complement 110.

Appearance.—The only four-funnelled boats left in the Service. In "**Nimrod**" the four funnels were originally of the same height, but the foremost was lengthened to clear the bridge, when this was built up in 1915. "**Abdiel**" has equal height funnels.

FLOTILLA LEADERS

"SEYMOUR" class (4 boats), Emergency War Programme 1915-16

ANZAC (Denny), **GRENVILLE, SAUMAREZ, SEYMOUR** (Cammell-Laird)

Are modified **"Nimrods"** in which the 4-inch gun placed between the two foremost funnels has been shifted forward to the forecastle and mounted on top of a shelter deck to superfire over the bow gun—a disposition which was extended to the after guns in the subsequent **"V"** class. In addition the uptakes from the forward furnaces were combined to form one large funnel instead of two smaller ones as in **"Nimrod"**—an arrangement which detracts considerably from their appearance. Otherwise they are similar to **"Nimrod."** **"Anzac"** was presented to the Royal Australian Navy in 1919.

Dimensions.—As **"Nimrod."**

Armament.—Four 4-inch; two 2-pounder A.A.; one Machine and four Lewis guns. Four 21-inch tubes in pairs amidships.

Machinery.—As **"Nimrod."** Oil 515/416 tons. Complement 110.

"Admiralty "V" Leaders" (5 boats), Emergency War Programme 1916-17

VALENTINE, VALHALLA (Cammell-Laird), **VALKYRIE, VALOROUS** (Denny), **VAMPIRE** (White)

These boats are sisters to the **"V"** class destroyers but are fitted out as Leaders.

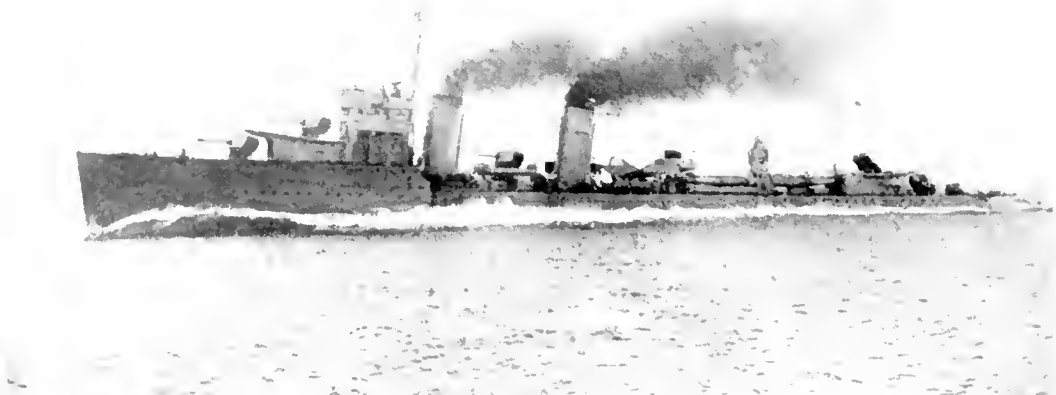
Dimensions.—312 × 29½ × 11¾ (maximum) = about 1,330 tons nominal and 1,510 tons deep load displacement.

Armament.—Four 4-inch; one 3-inch, and one Machine gun. Two sets of 21-inch triple tubes.

Machinery.—Geared turbines = 27,000 H.P. driving 2 screws = 34 knots (31 knots at deep load). 3 Yarrow boilers, except **"Vampire"**(White-Forster). Oil 322/369 tons. Complement 120.

"Valkyrie" was mined amidships early in Service 1917 and had to be practically rebuilt. All saw service during the War.

Anzac.



FLOTILLA LEADERS

"SHAKESPEARE" class (5 boats), Emergency War Programme 1916-18

BROKE (ex Rooke), KEPPEL, SHAKESPEARE, SPENSER, WALLACE

Thornycroft type

With the exception of the latest Japanese boats these are the finest destroyers in existence, and are practically light cruisers compared with the t.b.d's of a few years ago. Fine, big, weatherly boats with a high speed and heavy armament they have long been the source of admiration abroad, and reflect the highest credit upon the firm of Thornycroft who designed them. In general outline they are enlarged "**W**"s with an additional 4.7-inch gun between the funnels, and have the advantage of a couple of knots in speed—marked superiority considering that their tonnage is only 425 tons in excess of that of the "**W**" class.

Dimensions.—329 × 32 × $14\frac{3}{4}$ (maximum) = 1,750 tons.

Armament.—Five 4.7-inch ; one 3-inch A.A. or one 2-pounder ; six tubes in two triple mountings.

Machinery.—Geared turbines driving 2 screws = 40,000 H.P. = 36 knots. This has been exceeded on trials, "**Shakespeare**" having made 38.7 knots. Oil = 398,500 tons. Complement 160.

Appearance.—Very handsome and powerful looking boats with large equal sized, flat sided funnels. Differ from the Thornycroft "**W**" boats by reason of the larger fore funnel and additional gun amidships.

"**Shakespeare**" was badly mined during the War (1918). *"**Keppel**" and "**Broke**" launched in 1920, are completing at Portsmouth Dockyard.

FLOTILLA LEADERS

"ADMIRALTY" type (7 boats), Emergency War Programme 1917-18

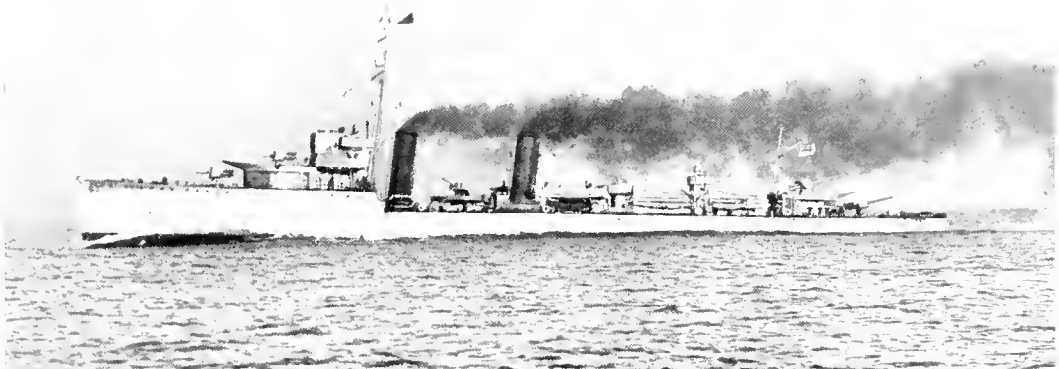
BRUCE, CAMPBELL, DOUGLAS, MACKAY, MALCOLM (Cammell-Laird), **MONTROSE, STUART** (Hawthorn-Leslie)

Slightly bigger than the Thornycroft boats, but of the same design.

Dimensions.—$332\frac{1}{2} \times 31\frac{3}{4} \times 14\frac{3}{4}$ feet = 1,801 tons nominal and 2,053 tons deep load displacement.

Armament and **Machinery.**—As **"Shakespeare"** class.

Appearance.—Like **"Shakespeare"** class, but have thin round funnels.



STUART.
(*Note narrow funnel*).

P.38.

PATROL BOATS

"P" class (7 boats), Emergency War Programme, 1917

P. 31, P. 38, P. 40, P. 46, P. 47, P. 59.

Were designed for patrol, escort work, and submarine hunting and proved to be a most efficient type for the purpose, being fast, economical, shallow-draught boats of low visibility and good sea-keeping qualities. At first sight they might easily be mistaken for submarines as the funnel merges into the superstructure and they lack the conventional features of torpedo craft. In addition to a formidable steel ram they were armed with guns, torpedo tubes, and depth charges and were able to reach 23 knots when new. Forty eight of the class were built, but the bulk of them have now been disposed of, or are reduced to C. and M. parties in Reserve.

Dimensions.—$244\frac{1}{2} \times 23\frac{3}{4} \times 8$ feet = 613 tons displacement.

Armament.—P. 22 carries two 4-inch guns; the rest mount one 4-inch and one 2 pounder pom-pom. Some still retain the 14 inch torpedo tubes, but these were removed and replaced by rails and depth charges in most of the boats.

Machinery.—Geared turbines driving 2 screws = 3,500 H.P. = 20 knots. Oil fuel 50.93 tons. Complement 54.

PATROL BOATS "P.C." class (7 boats), Emergency War Programme, 1917-18

P.C. 43, P.C. 56, P.C. 60, P.C. 71, P.C. 72, P.C. 73, P.C. 74

When it was found that the U boats submerged as soon as a patrol boat was sighted and, avoiding warships, were concentrating their efforts on the destruction of merchant shipping, it became necessary to make use of their methods of attack as a means for destroying them. The "Q" boat, an armed decoy merchant ship, was introduced and at a later date warships were built to resemble tramp steamers for the purpose of inviting attack on what appeared to be unescorted convoys. When a U boat closed in to deliver a torpedo attack on what appeared to be an innocent-looking tramp steamer in the wing of a convoy, the "tramp" might suddenly swing round as the line of bubbles denoting the course of the torpedo was sighted and show an altogether unexpected turn of speed as she dashed up to depth-charge the area in which the U boat was submerged. In addition to the later sloops, a number of "P" boats were converted into "tramps" and these were known as "P.C." boats. The hull was built up with forecastle and well-decks, a funnel and masts fitted, and the usual deck houses, bridge, and boats completed the picture. A 4-inch gun was concealed astern under a dummy deck cargo and a couple of 12-pounders fired through lidded ports by the chart house; torpedo tubes were fitted at one time, but these were removed to make way for depth charge throwers, etc. Owing to their light draft torpedoes could be expected to pass beneath them and the "bulges" with which they were reported to have been fitted were only wooden girthings added to increase the beam and improve stability.

Seen on the beam they looked just like coasting steamers, but their fine lines as viewed from ahead or astern tended to betray that they were warships.

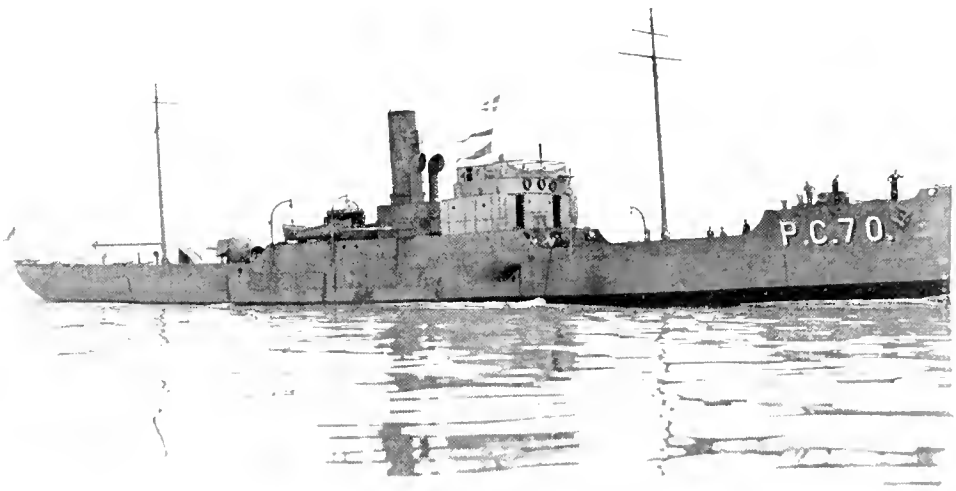
The bulk of them have now been disposed of and those remaining are employed in the anti-submarine flotillas or paid off in the reserve.

Dimensions.—247 × 26¾ × 8 feet = 694 tons displacement.

Armament.—One 4-inch and two 12-pounder guns. 24/30 depth charges.

Machinery.—Geared turbines driving 2 screws = 3,500 H.P. = 20 knots. Oil fuel 164 tons. Complement 55.

Appearance.—**P.C. 71-74** have no main mast. The convoy sloops which resembled them in profile (although much larger) have been placed out of commission.



P.C. 70.

CMB 70ft type

COASTAL MOTOR BOATS

These remarkable little craft were designed by Messrs. Thornycroft to fill the Admiralty requirements for a high speed, shallow draft torpedo boat capable of attacking enemy bases. Three types were evolved, the 40 feet, 55 feet, and 70 feet, with speeds ranging from 29 to 41 knots. The first boats completed in 1916 ran their trials secretly at night, and were first employed on a raid against Zeebrugge. It was soon seen that their sphere of usefulness could be extended to include mine laying, smoke screening, and depth charge dropping, and a number of boats were fitted for these duties. In a general way they can be said to have taken the place of the small torpedo boats of former days and their future development is full of possibilities.

The following boats are still retained in the Navy List.

C.M.B. 11, 23b, 30b, 33b, 49, 59, 73bd, 75b, 80c, 81c, 82c, 84c, 85c, 90bd, 91b, 92bd, 93e, 94e, 95e 97e, 98e, 102mt, 103m, 104m, 112, 113ck, 115d, 116a, 117d, 118d, 119d, 120f, 121, 122, 123.

First type. **"40 feet"**—45 feet (over trough) × 8½ × 2 feet 7½ inch = 5 tons. One torpedo carried in central trough at stern. Numbered without series letter.

Second type. **"55 feet."**—Dimensions: 60 feet (over trough) × 11 × 3¼ = 10 tons. Armed with 4 Lewis guns and two 18-inch torpedoes. Some have one torpedo and 2 to 4 depth charges. Speed 34 knots.

Third type. **"70 feet."**—Dimensions: 72½ × 14 × 3½ feet = 21 tons. Armed with 6 Lewis guns, 5 torpedoes or 4 mines. Speed 28½ knots. Nos. 121, 122, 123 only.

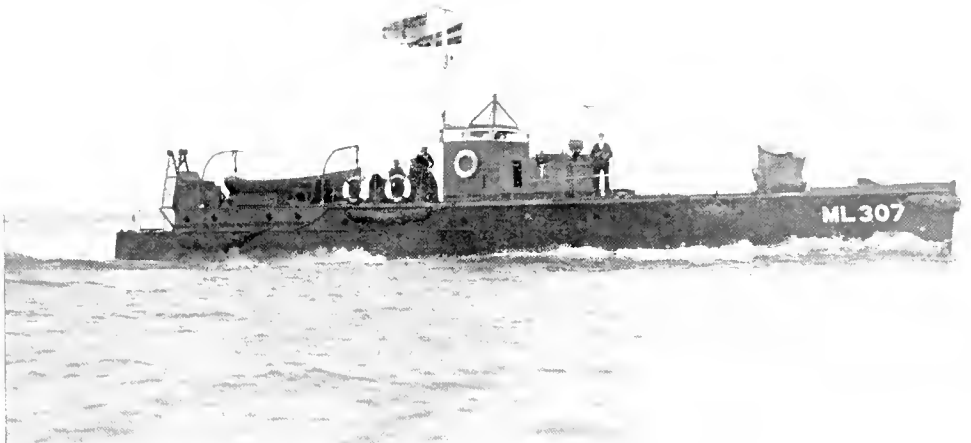
MOTOR LAUNCHES

Some 580 of these launches were built in America and Canada between 1915 and 1918 of which only 24 now remain in the Navy List. They are built of wood, and the dimensions are 80 × 12¼ × 5 feet giving a displacement of 37 tons. Owing to the shape of their sterns and light construction they proved able to carry on in moderate weather and keep their speed, although extermely lively. With motors of 440 B.H.P. they have a designed speed of 19 knots. During the War they were ubiquitous and served in practically every theatre of operations, on patrol, mine-laying, and screening work, but their most famous exploits were in connection with the Ostend and Zeebrugge raids.

The following numbers are still in the Navy List :—

M.L. 8, 162, 166, 190, 196, 235, 243, 247, 248, 249, 268, 287, 291, 307, 339, 344, 358, 473, 519, 542, 568, 576.

They are now armed with one 3-pounder gun, and have a complement of 10.



M.L. 307.

CRICKET

GUNBOATS

"APHIS" class (12 ships), Emergency War Programme

APHIS, BEE (Ailsa Co.), **CICALA, COCKCHAFER, CRICKET, GLOWWORM** (Barclay Curle), **GNAT, LADY BIRD** (Lobnitz), **MANTIS, MOTH** (Sunderland S.B.), **SCARAB, TARANTULA** (Wood, Skinner Co.)

Although ordered and constructed as "Chinese River Gunboats" in order to conceal their objective, these boats were designed for service on the Danube, and it was intended that they should proceed to Salonika, be dismantled, and transported in sections to the Danube, and there re-erected. The course of events in the Near East, however, put an end to the scheme, and they were utilised on the Tigris and Euphrates, Home, and North Russian waters and Black Sea instead. Their design and construction reflects the greatest credit upon Messrs. Yarrow and the firms who built them. Drawing only a few feet of water their screws revolve in tunnels into which the water is sucked, while their engine power, triple rudders, and speed allow them to navigate against strong currents with remarkable precision.

Dimensions.—237½ × 36 × 4 feet = 645 tons displacement.

Armament.—Two 6-inch; one or two 12-pounders; 6 Machine guns.

Machinery.—Triple expansion engines driving twin screws = 2,000 H.P. = 14 knots. Yarrow boilers. Fuel 35 tons coal and 54 tons oil (**"Glowworm"** and **"Moth"** 76 tons oil only). Complement 60.

APHIS.—Served in Egyptian and Mediterranean waters 1916-18; Black Sea 1919; Danube 1920-21. Now in Reserve at Malta. **BEE.**—Lost her stern on the way to Malta where a new one was fitted 1916; East Indies 1917; China 1918-22. **CICALA.**—Humber defence 1916-18; White Sea 1919 (mined); China 1920-22. **COCKCHAFER.**—Nore defence 1916-18; White Sea 1919; China 1920-22. **CRICKET.**—Humber defence 1916-18; White Sea 1919; China 1920-22. **GLOWWORM.**—Lowestoft defence 1916-18; White Sea 1919; Danube 1920-22. **GNAT.**—East Indies 1916-17; China 1918-22. **LADYBIRD.**—Egyptian and Mediterranean waters 1916-18; Black Sea 1919; Danube 1920-22. **MANTIS.**—East Indies 1916-18; Nore and White Sea 1919; China 1920-22. **MOTH.**—East Indies 1916-18; Nore and White Sea 1919; China 1920-22. **SCARAB.**—East Indies 1916-17; China 1918-22. **TARANTULA.**—East Indies 1916-17; China 1918-22. (East Indies includes operations on Tigris or Euphrates).

GUNBOATS "DWARF," "THISTLE" (1897 Estimates) London and Glasgow Co.

Small foreign service gunboats which have served on the African station.

Dimensions.—187½ × 33 × 9½ feet = 710 tons.

Armament.—Two 4-inch ; four 3-pounders and four pom-poms.

Machinery.—Vertical triple expansions engines driving 2 screws. Yarrow boilers. 1,300 H.P. = 13.9 knots. Coal 145 tons. Complement 90.

ROYAL AUSTRALIAN NAVY

"UNA" (ex German **"Komet"**) 1911. Dimensions.—210½ × 31 × 15¾ feet= 1,438 tons. Guns.—Three 4-inch ; two 12-pounders. H.P. 1,300 = 16 knots. Coal 270 tons. Complement 114.

RIVER GUNBOATS

WIDGEON (1904), TEAL, MOORHEN (1901), built in sections by Yarrows and re-erected in China.

Dimensions.—165 × 24½ × 2¼ feet = 180 tons. Guns.—Two 6-pounders and 4 Machine guns. Bullet-proof hulls. H.P. 670 = 13 knots. Complement 35. Coal 39 tons.

WOODCOCK (1897), WOODLARK (1897), built by Thornycrofts.

Dimensions.—148½ × 24 × 2 feet = 150 tons. Guns.—Two 6-pounders ; four Machine guns. Bullet-proof hulls. H.P. 550 = 13 knots. Coal 28 tons. Complement 25.

ROBIN (1897) built by Yarrows.

Dimensions.—107¾ × 20 × 2 feet = 85 tons. Guns.—Two 6-pounders. H.P. 240 = 9 knots. Coal 11 tons. Complement 25. Tunnel screw type.

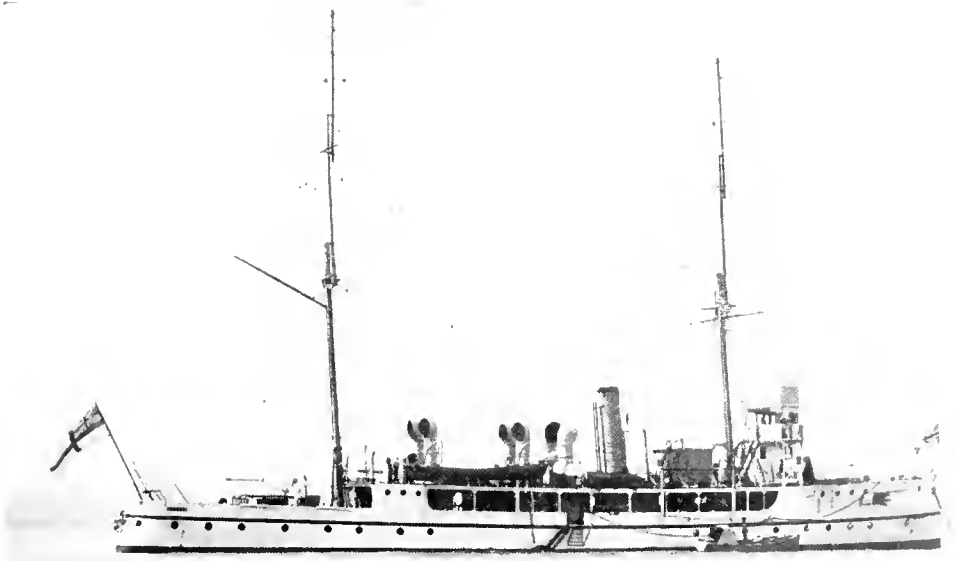
OLD SLOOP "ESPIEGLE" (Sheerness Dockyard) 1900-03

The last of a long line of pretty little ships which were built for overseas stations.

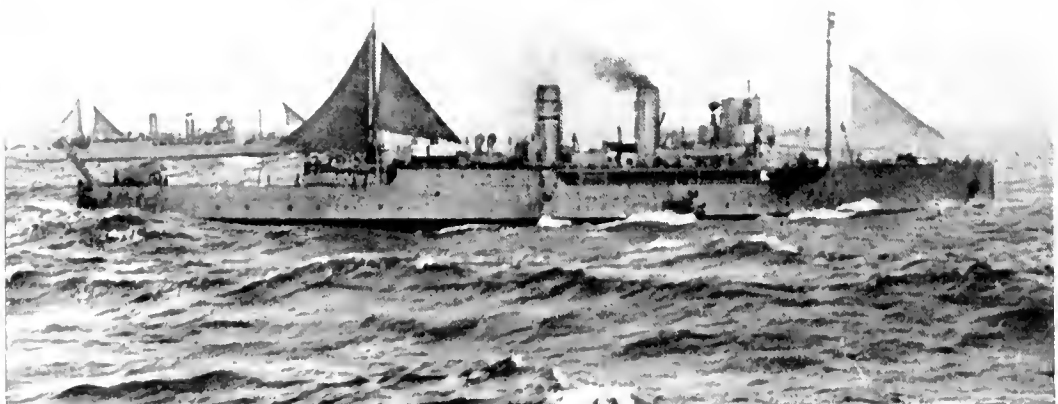
Dimensions.—210 × 33 × 11¼ feet (mean) = 1,070 tons.

Armament.—Six 4-inch ; four 3-pounders and 2 Machine guns.

Machinery.—Vertical triple expansion engines driving 2 screws = 1,400 H.P. = 13¼ knots. Niclausse boilers. Coal 195 tons. Complement 110. Is now on the East Indies Station.



THISTLE.



AZALEA CLASS (*under steadying sail*)

SLOOPS

The " FLOWER " class. " Azalea " type (8 ships), Emergency War Programme, 1915

The shortage of mine-sweepers capable of working with the Fleet in 1914 led to the construction of this special class of fast, light draught, sea-keeping vessels of which 72 in all were built. With the object of hastening their construction as much as possible mercantile practice was followed with regard to their hulls and machinery, and the orders were placed with a number of firms who had not hitherto specialised in warship construction. The design was made as simple as possible, they were built under Lloyds' survey, and the average building period worked out at about 25 weeks—a very creditable achievement for vessels of 1,250 tons displacement. Of the twenty four ordered in Dec., 1914, the following remain in the Service :—

BLUEBELL (Scotts), **CLEMATIS** (Greenock and Grangemouth), **FOXGLOVE** (Barclay Curle), **HOLLYHOCK** (Barclay Curle), **LABURNUM** (Connell), **MAGNOLIA** (Scotts), **MALLOW** (Barclay Curle), **VERONICA** (Dunlop, Bremmer).

The hull has a fine entry with a considerable flare but no sheer, the forecastle extending just abaft the foremast beyond which there is a berthing continued aft which in the later ships is carried up to the boat deck amidships. There is a triple hull at the bows—a special feature to enable them to withstand mine and collision—and the keel is flat from forefoot to sternpost. Being single screw ships they have a wide turning circle, and in a seaway are lively to a degree, but can face any weather with safety. Besides being employed as mine-sweepers they were used for escort purposes, and in many cases were fitted to carry kite balloons.

Dimensions.—262½ × 33 × 12 feet (maximum) = 1,200/1,325 tons displacement.

Armament.—Two 4-inch and four 3-pounders guns.

Machinery.—One set of 4-cylinder triple expansion engines = 1,800 H.P. = 16.5 knots. Two cylindrical boilers, one screw. Coal = 130/250 tons. Complement 88/100.

Appearance.—Easily recognised by their widely spaced masts, bridge and funnels. **" Hollyhock "** and **" Magnolia "** may still have no main-mast, which was removed when the ships were altered to carry kite balloons.

MALLOW presented to Royal Australian Navy, 1919.

SLOOPS (*continued*)

"ARABIS" type (12 ships)

These are slightly larger than the foregoing and all have the berthing amidships carried up to the boat deck. Several have been re-fitted for foreign service and now have extra quarter deck cabins, and a director platform built on to the bridge, their displacement being raised to 1,500 tons normal at 14 feet draught. Of the original 48, the following are still in commission :—

CORNFLOWER (Barclay Curle), **CROCUS** (Lobnitz), **CYCLAMEN** (Lobnitz), **GERANIUM** (Greenock and Grangemouth), **GODETIA** (Connell), **LOBELIA** (Simons), **MARGUERITE** (Dunlop, Bremmer), **SNAPDRAGON** (Ropner), **VALERIAN** (Rennoldson), **VERBENA** (Blythe), **WALLFLOWER** (Irvine), **WISTERIA** (Irvine).

Dimensions.—$267\frac{3}{4} \times 33\frac{1}{2} \times 11\frac{3}{4}$ (maximum) = 1,250 tons displacement.

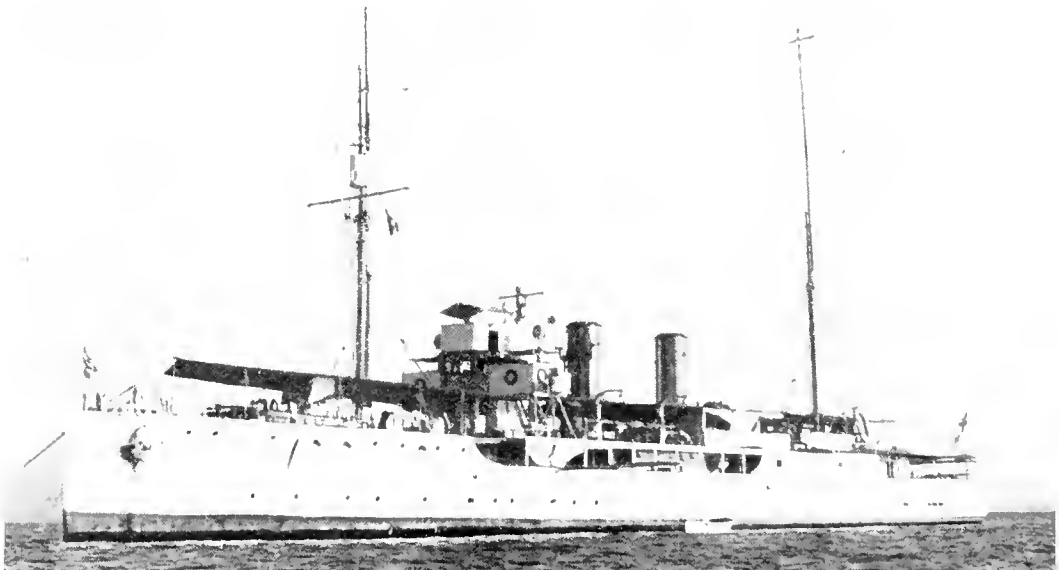
Armament.—All carry two 4 inch and four 3 pounders, excepting :—"**Lobelia**" (two 4-inch) "**Godetia**" (one 4-inch ; one 12-pounder). "**Geranium**" and "**Marguerite**" (one 4.7-inch ; two 3-pounders). "**Snapdragon**" (at present unarmed).

Machinery.—As in "**Azalea**" type, but of 2,000 H.P. = 16.5 knots.

Appearance.—"**Snapdragon**" fitted as fleet photographic ship with a cinema cabin over quarter deck, and no after mast.

GERANIUM and **MARGUERITE.**—Presented to Royal Australian Navy, 1919.

LOBELIA.—Presented to Newfoundland.



CYCLAMEN.

HAREBELL.

" FLOWER " class, Convoy Type (6 ships), Emergency War Programme, 1916-18

The success of the earlier " **Q** " boats led to the decision to adapt the later sloops for service as convoy escorts and decoy ships, by giving them the appearance of merchant vessels and adding all the latest anti-submarine devices to their armament. The builders were allowed a good deal of latitude as regards the details of their profile, with the result that there was considerable variation in appearance. All had one funnel, some two masts and some a foremast only, while the well-decks were canvassed in or left open according to fancy ; the forecastle, poop, forward shelter deck and bridge and boat becks were of the conventional " tramp " pattern and while some made better imitations of the average merchant ship than others, it was only when viewed from the bow or quarter that their fine lines betrayed them as warships. Owing to the way in which they had to invite and surrender themselves to attack by U boats the losses in this class were heavy, eight out of thirty-nine being sunk. Of the remainder the bulk have been put on the sale list or disposed of, and those which are retained for service are as follows :

BRYONY (Elswick), **CEANOTHUS** (Elswick), **CHRYSANTHEMUM** (Elswick), **HAREBELL** (Barclay Curle), **HEATHER** (Greenock and Grangemouth), **LYCHNIS** (Hamilton).

Dimensions.—267 × 35 × 13½ (maximum) = 1,290 tons displacement.

Armament.—Two 4-inch and two 12-pounder guns ; depth charge throwers. (" **Bryony** " has no 12-pounders, and " **Heather** " one 3-pounder instead).

Machinery.—As in " **Azalea** " but of 2,500 H.P. = 16.5 knots. Coal 260/316 tons. Complement 90/116.

Appearance.—" **Bryony** " has an additional deck house abaft the foremost and most of her " merchant ship " fittings removed. " **Chrysanthemum** " fitted for fleet photography purposes, as " **Snapdragon.**"

CEANOTHUS and **LYCHNIS.**—Presented to the Government of India.

MINESWEEPERS

"HUNT" class (14 ships) Emergency War Programme, 1918-19

Experience having shown that the draught of the **"Flower"** class of mine sweeper was attendant with considerable risk in sweeping, the depth in later types was considerably reduced, and in order to secure stability it was decided to adopt the paddle-wheel instead of the single screw. Numerous excursion steamers driven by paddles had been serving as sweepers since the beginning of the War, and had proved efficient, so the **"Racecourse"** class which followed the **"Flowers"** in 1916 were modelled on their lines generally. For one reason and another they were not altogether successful, and all of them have now been placed out of commission, and with the exception of six which are still in the Central Reserve of Minesweepers, are for disposal. In the **"Hunt"** class almost the same type of hull was retained, but twin screws replaced the paddles and a most efficient type of sweeper resulted. Although extremely lively they are quite passable sea-boats and altogether over 100 were built or ordered. The bulk of these have now been disposed of, or are out of commission in the Central Reserve and retained with care and maintenance parties aboard; those in the following list are still being employed;—

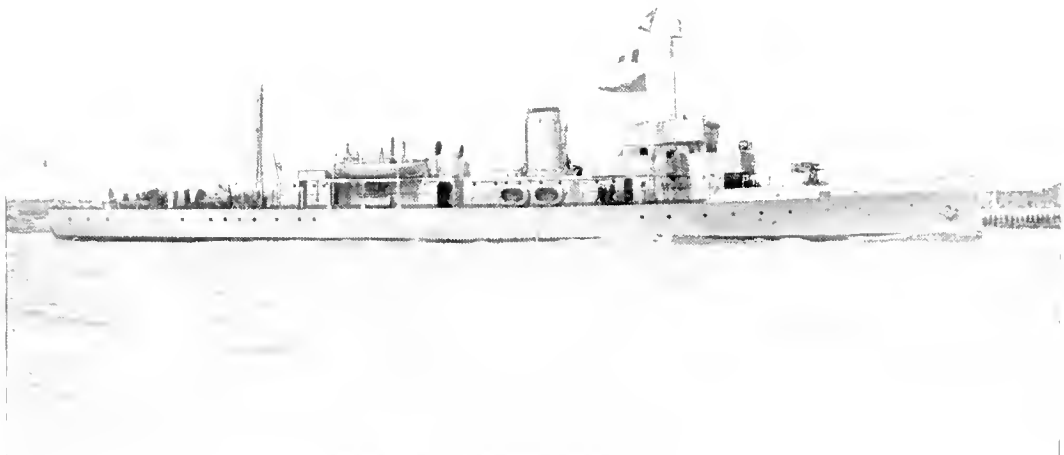
ALRESFORD (Ailsa Co.), **BADMINTON** (Ardrossan Co.), **BURSLEM,** (3) **CARSTAIRS,** (3) **CATERHAM** (Bow, McLachlan), (2) **FORRES** (Clyde S.B. Co.), (2) **FERMOY** (Dundee S.B. Co.), (2) **MARAZION** (Fleming and Ferguson), **MISTLEY** (Harkness), **NEWARK** (Inglis), (1) **PETERSFIELD** (Lobnitz), **SHERBOURNE, TRING, TRURO** (Simons).

Dimensions.—231 × 28½ × 7½ feet (mean) = 840 tons displacement.

Armament.—One 4-inch and one 12-pounder; or (1) one 4-inch and four 3-pounders; (2) one 6-pounder; (3) unarmed.

Machinery.—Verticle triple expansion driving 2 screws = 2,200 H.P. = 16 knots. Yarrow boilers. Coal 185 tons. Complement 65.

Appearance.—Height of masts varies. Many have had the sweeping gear removed and a deck house built aft.



NEWARK.

Princess Margaret.

MINE LAYERS.

"PRINCESS MARGARET" (built 1913-14. Bought 1919)

Formerly a Canadian Pacific liner, the **"Princess Margaret"** was chartered and converted into a mine-layer during the War and was employed laying the North Sea mine fields and barrages.

Dimensions.—$395\frac{1}{2} \times 54 \times 16\frac{1}{2}$ feet = 5,070 tons.

Armament.—Two 4-inch; two 3-inch A.A. guns. Carries 400 mines.

Machinery.—Turbines of 15,000 H.P. = 22.5 knots. Oil = 585 tons. Complement 225.

MINE LAYERS (*continued*)

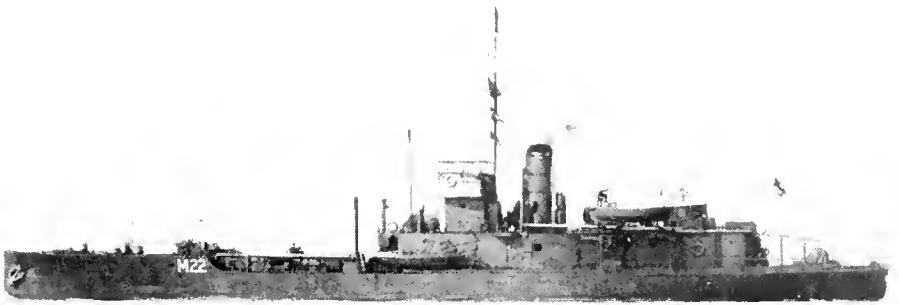
M. 22, M. 31 (Emergency War Programme) 1915

Originally built as monitors, they were disarmed and converted into mine layers 1920-21.

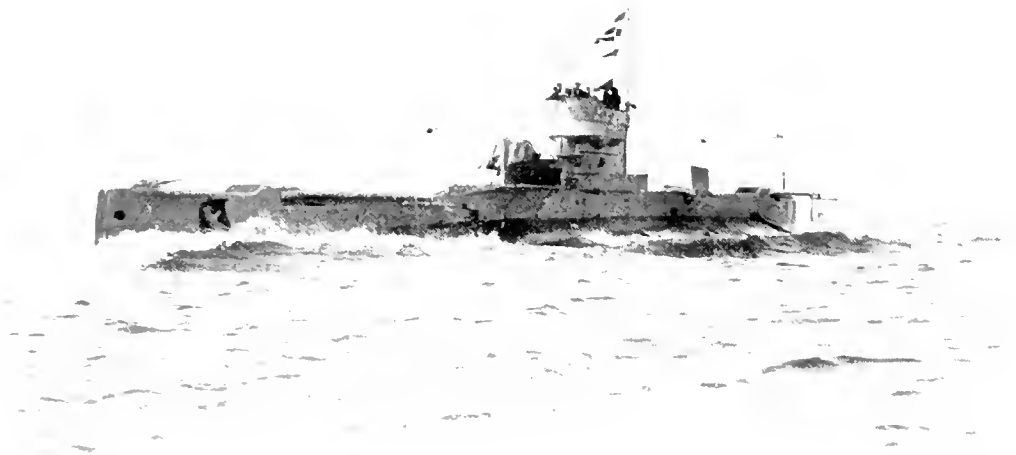
Dimensions.—170 × 31 × 6½ feet = 540 tons.

M. 22.—Built by Raylton Dixon & Co. Served in the Mediterranean and Ægean ; was armed with an old 9.2-inch forward and a 12-pounder aft ; I.H.P. 650 = 12 knots. Now carries 44 mines. Tender to **" Vernon ",** Portsmouth.

M. 31.—Built by Workman Clark. Served in Mediterranean, Egyptian waters, and White Sea ; was armed with two 6-inch and smaller guns ; H.P. 400 = 10 knots. Now carries 52 mines. Paid off at Devonport.



M. 22. (*Fitted as a mine layer*).



L 48.

SUBMARINES

" E " class (14 boats), Emergency War Programme, 1915-1916

E. 23 (Vickers), **E. 27** (Yarrow), **E. 31** (Scott), **E. 32** (White), **E. 33** (Thornycroft), **E. 35** (Brown), **E. 38** (Fairfield), **E. 41, E. 42, E. 45, E. 46** (Cammell-Laird), **E. 48** (launched Fairfield, completed Beardmore), **E. 53** (Beardmore), **E. 55** (Denny).

Our earliest submarines of the **" A," " B,"** and **" C "** types were modelled on the **" Holland "** design with cigar-shaped hulls, single screw petrol engines, and torpedo tubes in the bow disposed horizontally. In the **" D "** class which followed them external side ballast tanks were introduced, and Diesel engines driving twin screws adopted ; a stern torpedo tube was fitted and the bow tubes disposed one above the other which reduced the resistance and allowed for a remodelling of the bows. The **" D "** class also possessed greater habitability, were safer, and in **D.4** a 12-pounder gun was mounted experimentally. In the **" E "** class which were first included in the 1910-11 programme and with various slight modifications continued to be built until 1916-17, broadside tubes were introduced and the hull was subdivided by watertight transverse bulkheads—a feature which added considerably to the strength of the hull and enabled them to dive to greater depths than had been considered safe or necessary. Fifty five **" E "** boats were built and their War record is one of brilliant achievements while they proved most successful from a constructional point of view. Twenty-seven were lost, two sunk and salved, and of the remainder all excepting fourteen have been struck off the list—and these are likely to find their way to the scrap heap soon. **E. 48** is employed as a target boat only.

Dimensions.—181 × 22½ × 12½ feet = 662/807 tons.

Armament.—**E. 23, 31, 32, 33, 35, 38, 42**—one 12-pounder, five torpedo tubes. **E. 53**—one 12-pounder, four tubes. **E. 27, 55**—five tubes only. **E. 41, 46**—one 12-pounder, three tubes, twenty mines. **E. 45**—three tubes, twenty mines.

Machinery.—Two sets of Diesel engines 1,600 H.P. = 15 knots (surface). Electric drive 807 H.P. =10 knots submerged. Fuel 45 tons. Complement 30.

"C.H." class (2 boats), Emergency War Programme, 1919

C.H. 14, C.H. 15

(Royal Canadian Navy)

These boats were built by Vickers at Montreal and presented to the Canadian Navy in 1919. They are of the early "H" type with 18-inch tubes and are slightly smaller than the boats of the "H" type now in the service.

Dimensions.—150¼ × 15¾ × 12½ feet = 364/434 tons displacement.

Armament.—Four bow 18-inch torpedo tubes.

Machinery.—Two sets of Diesel engines = 480 H.P. = 13 knots (surface). Electric drive = 320 H.P. = 11 knots (submerged). Fuel 14 tons. Complement 22.

"H" class (22 boats), Emergency War Programme, 1917-19

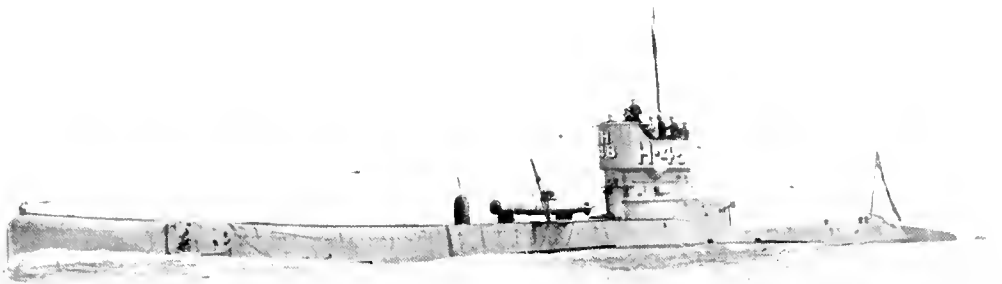
H. 21, H. 22, H. 23, H. 24, H. 25, H. 26, H. 27, H. 28, H. 29, H. 30, H. 31, H. 32 (all Vickers); **H. 33, H. 34** (Cammell-Laird); **H. 43, H. 44** (Armstrong); **H. 47, H. 48, H. 49, H. 50** (Beardmore); **H. 51, H. 52** (Pembroke Dockyard).

Are of the single-hulled American-Holland type modified by the Admiralty from the first boats of the class which came over from Canada under their own power in 1916. They are a most successful and popular design, and had the reputation of being the fastest divers and safest boats in the Service.

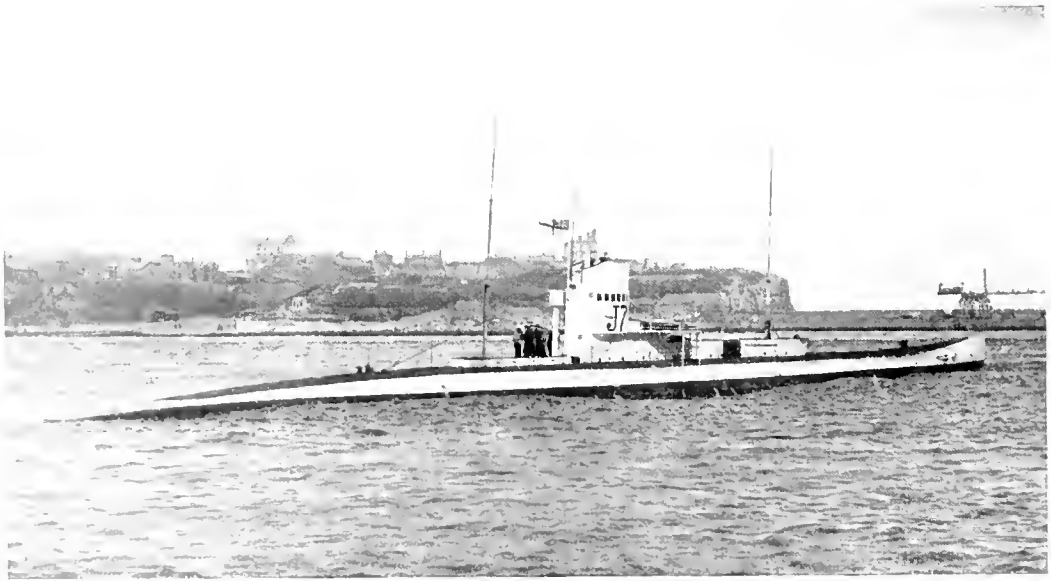
Dimensions.—170¾ × 15¾ × 11¼ feet = 440/500 tons.

Armament.—Four 21-inch bow tubes. No guns.

Machinery.—Two sets of Diesel engines of 480 H.P. = 13 knots (surface). Electric drive 320 H.P. = 10.5 knots (submerged). Fuel 16 tons. Complement 22.



H 48.



17

"J" class (6 boats), Emergency War Programme, 1915-17

J. 1, J. 2 (Portsmouth Dockyard); **J. 3, J. 4** (Pembroke Dockyard); **J. 5, J. 7** (Devonport Dockyard);

(Royal Australian Navy. Presented 1918).

In 1915 "**F.1.**" the first of the Admiralty double-hulled boats was built. She was 151 feet long and although two more of the type were ordered, they were not altogether a success, mainly on account of their small size. The "**G**" class which followed were double-hulled, 187 feet long and 700/975 tons displacement and may be regarded as our first ocean-going submarines; from these the "**J**" class were developed and both in appearance and general design they are big editions of the "**G**" boats. In order to counter certain German submarines whose speed was alleged to have been over 18 knots, they were designed for 19.5 knots on the surface, which made them the fastest submarines afloat. As originally completed they carried a 4-inch gun on the breast-work forward of the conning tower, but later this breast-work was continued forward to the bow and merged into the hull form to improve flotation while the gun was moved to the top of the conning tower. They are magnificent boats and most successful in every way.

Dimensions.—$274\frac{3}{4} \times 23\frac{1}{2} \times 14$ feet = 1,260/1,820 tons. **J. 7** is slightly smaller than the rest, and differs in appearance.

Armament.—One 4-inch gun; 4 bow and 2 broadside 18-inch tubes.

Machinery.—Three sets of Diesel engines = 3,600 H.P. = 19.5 knots (surface). Electric drive 1,400 H.P. = 9.5 knots (submerged). Oil fuel 80/91 tons. Endurance 4,000 miles at 12 knots. Complement 44.

"K" class (8 boats), Emergency War Programme, 1916-17

K. 2 (Portsmouth Dockyard), **K. 6** (Devonport Dockyard), **K. 8** (Vickers), **K. 12** (Armstrong), **K. 14, K. 22** (ex **K. 13**) (Fairfield); **K. 16** (Beardmore), **K. 26** (Vickers and Chatham Dockyard).

The need for ocean-going submarines which could cruise with the Fleet led to the production of the "**K**" class in which the ordinary oil engines were replaced by steam driven turbines with a Diesel engine as auxiliary surface power. Previous experiments had been conducted with the steam driven "**Swordfish**" (1913-14 programme) which, however, had not been a success and was eventually converted into a surface patrol boat. In every way the "**K's**" are the most interesting submarines yet built and although for various reasons they are now being transferred to the disposal list, still hold the distinction of being the largest and fastest under-water craft in the world. As originally completed they had a flush deck with a slight sheer forward, a superstructure amidships housing a couple of above-water 18-inch torpedo tubes, and their guns were mounted before and abaft this on the hull. In order to improve their sea-going qualities the bows were built up into a high clipper stem and the guns were removed to the superstructure, while the above-water tubes were taken out, and the conning tower was surmounted by a navigating bridge screen. There are two funnels which are hinged and lowered into wells covered by water tight hatches before diving, when the steam power is used until exhausted prior to the electric motors being employed. Owing to their great length and speed they are apt to dive deeply, and their control demands especial skill; on the surface they are good sea-boats but are liable to ship water into the control room, causing "earths." Internally they are quite spacious with a ward-room and good accommodation for officers and men.

Dimensions.—338 × 26½ × 16 feet = 1,880/2,650 tons displacement.

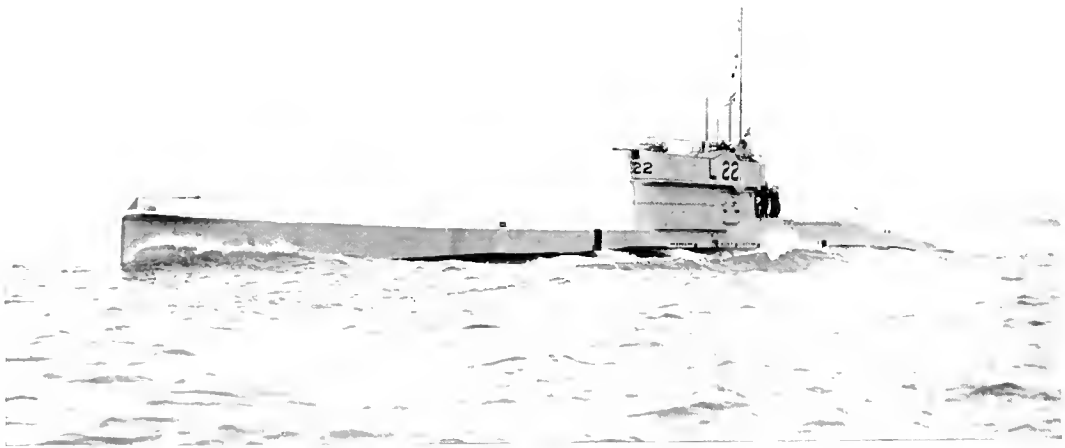
Armament.—One 4-inch and one 3-inch A.A. guns; four bow and four beam 18-inch torpedo tubes.

Machinery.—Geared turbines of 10,000 H.P. = 24 knots (surface). Electric drive = 1,400 H.P. = 9.5 knots (submerged). Oil fuel 200/300 tons. Complement 55.

K. 13 foundered when diving on trials owing to her funnel hatches having been left open and the remarkable circumstances which led to the rescue of her crew and subsequent salvage are well known. She was afterwards re-numbered **K. 22. K. 26** may differ in certain details from the rest as she has not yet been completed.

K 12

(Res. have guns abaft C.T. and no cut-water to superstructure).



L 22

"L" class (32 boats), Emergency War Programme, 1917-22

L. 1, L. 2, L. 3, L. 4, (Vickers), **L. 5** (Swan Hunter), **L. 6** (Beardmore), **L. 7, L. 8** (Cammell-Laird), **L. 9** (Denny), **L. 11, L. 12, L. 14** (Vickers), **L. 15, L.1 6** (Fairfield), **L. 17—27** (Vickers), **L. 33** (Swan-Hunter), **L. 52, L. 53** (Armstrong), **L. 54** (Denny), **L. 56** (Fairfield), **L. 69** (Beardmore and Rosyth Dockyard), **L. 71** (Scotts).

Completing at Chatham, **L. 23, L. 53 ;** Portsmouth, **L. 26, L. 27 ;** Devonport, **L. 54.**

Are enlarged **"H's"** (Admiralty saddle-tank type) and generally follow the design of that class but carry a gun and extra torpedo tubes. In all-round qualities can be regarded as the most successful type of submarine yet produced. There are differences in the profile and size of the conning tower between various boats, and some slight increase in length in the later numbers, while the armaments vary as shown in the list below.

Dimensions.—231 × 238 × 23½ × 13½ feet = 890/1,070 tons displacement ; the last six boats are 960/1,150 tons.

Armament.—**L. 1—8,** One 4-inch gun ; four bow and two beam 21-inch tubes. **L. 9—12, L. 15—16, L. 18—22,** One 4-inch gun ; six bow tubes. **L. 17, L. 26—27, L. 33,** One 4-inch gun ; four bow tubes. **L. 14, L. 25, L. 25,** Four bow tubes ; 14 mines. **L. 52—71** (6 boats), Two 4-inch guns ; six bow tubes.

Machinery.—Two sets of Diesel engines = 2,400 H.P. = 17.5 knots (surface). Electric drive 1,600 H.P. = 10.5 knots (submerged). Fuel 76/78 tons. Complement 36/40.

"M" class (3 boats), Emergency War Programme, 1917-20

M. 1, M. 2 (Vickers), **M. 3** (Armstrong)

The proposal to mount a big gun in a submarine was first made in Aug., 1915, by Lord Fisher, who had very definite ideas as to the future of the "Submarine Battleship" and the submarine generally. **"M. 1"** (ex K. 18) was put in hand at Vickers but not completed until April, 1918, by which time it was considered that her employment might be disadvantageous, inasmuch as the demonstration that the Submarine Monitor was practicable might lead to the enemy adopting the idea—and considering the limited use to which the **"M 1"** could be put, and the immense possibilities such a type might possess in U boat warfare the policy appears to have been eminently sound.

The big gun is a short 12-inch mounted inside a thin shield, with a slight lateral deviation but considerable elevation. It is loaded on the surface and can be fired when the boat is afloat or submerged; in the latter condition the gun is given full elevation and the boat dives until the muzzle is just above water, when the special sight used in conjunction with the periscope allows for it to be laid on the target accurately. Used in conjunction with aircraft for spotting purposes the **"M"** class are well adapted for bombarding and corsair work, although of limited use in battle, when their low speed and vulnerability would be against them.

Dimensions.—296/305 × 24½ × 15¾ feet = 1,600/1,950 tons displacement.

Armament.—One 12-inch and one 3-inch gun; four 18-inch bow tubes.

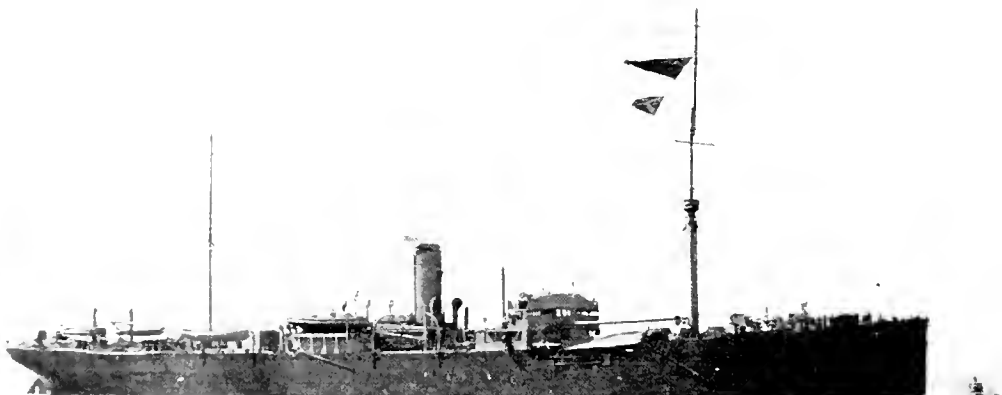
Machinery.—Two sets of Diesel engines = 2,400 H.P. = 15.5 knots (surface). Electric drive = 1,600 H.P. = 9.5 knots. Fuel 76 tons. Complement 60.

"XI" Experimental Boat. 1921-22 Estimates

This boat, which is now under construction at Chatham Dockyard, is designed to embody the lessons of war experience and subsequent experiments in our own and ex-German submarines. She is of very considerable dimensions and her details are as yet confidential.

"R" class (10 boats). All have been, or are to be, scrapped.

M. 3.



GREENWICH.

DILIGENCE.

BLENHEIM.

DEPOT SHIPS (Sea going).

For Destroyers.—

BLENHEIM.—(1890). Old first-class protected cruiser. Dimensions.—399¾ × 65 × 25¾ feet = 9,000 tons. Guns.—Three 4-inch. H.P. 13,000 = 19.3 knots. Coal 624/1,075 tons.

DIDO.—(1895). Old second-class protected cruiser. Dimensions.—373 × 54 × 22¼ feet = 5,600 tons. Guns.—Two 4-inch. H.P. 8,000 = 18.2 knots. Coal 1,076 tons.

DILIGENCE.—(purchased 1913). Dimensions.—405¼ × 46 × 20 feet = 7,400 tons. Guns.—Four 4-inch. H.P. 5,000 = 14 knots. Coal 780 tons.

GREENWICH.—(purchased 1915). Dimensions.—402 × 52 × 21 feet = 8,584 tons. Guns.—Four 4-inch, two 6-pounders A.A. H.P. 2,000 = 11 knots. Coal 960 tons.

HECLA.—(purchased 1878). Dimensions.—402 × 38¾ 22¾ feet = 5,600 tons. Guns.—Four 4-inch, one Machine. H.P. 2,400 = 13.4 knots. Coal 572 tons.

SANDHURST.—(purchased 1915). Dimensions.—485 × 58 × 20 feet = 11,500 tons. Guns.—Four 4-inch, two 6-pounders A.A. H.P. 4,000 = 10.5 knots. Coal 1,475 tons.

WOOLWICH.—(1912). Dimensions.—336 × 40 × 14½ feet = 3,380 tons. Guns.—Two 4-inch. H.P. 2,600 = 13.5 knots. Coal 350 tons.

DEPOT SHIPS *(continued)*

For Submarines.—

ADAMANT, ALECTO.—(1911). Dimensions.—212 × 32½ × 12¾ feet = 935 tons. No guns. H.P. 1,400 = 14 knots. Coal 180 tons.

AMBROSE.—(purchased 1915). Dimensions.—388 × 47½ × 20¾ feet = 6,000 tons. Guns.—Two 12-pounders. H.P. 6,350 = 14½ knots. Coal 540 tons.

CYCLOPS.—(purchased 1905). Dimensions.—477 × 55 × 21½ feet = 11,300 tons. Guns.—Six 4-inch. H.P. 3,500 = 11¾ knots. Coal 1,595 tons.

LUCIA.—(ex German liner, converted 1916). Dimensions.—366 × 45 × 19¾ feet = 5,805 tons. Guns.—Two 3-pounder A.A. H.P. 2,750 = 12.7 knots. Coal 615 tons.

MAIDSTONE.—(1912). Dimensions.—355 × 45 × 17¾ feet = 3,600 tons. Guns.—Nil. H.P. 2,800 = 14.3 knots. Coal 465 tons.

PANDORA.—(purchased 1914, converted 1920-21). Dimensions.—330 × 43 × 16 feet = 4,590 tons. Guns.—Nil. H.P. 2,200 = 11 knots. Coal 580 tons.

PLATYPUS.—(1917). Dimensions.—325 × 44 × 15¾ feet = 3,476 tons displacement. Guns.—Nil. H.P. 2,650 = 14 knots. Coal 450 tons. Complement 350. (Built for the Royal Australian Navy).

TITANIA.—(purchased 1915). Dimensions.—335 × 46¼ × 18½ feet = 5,250 tons. Guns.—Nil. Two torpedo tubes. H.P. 3,200 = 14.5 knots. Coal 498 tons.

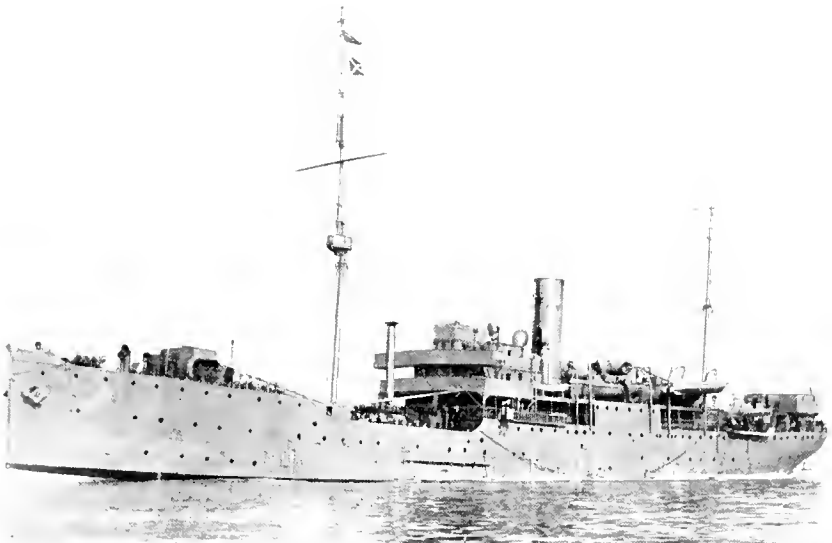
VULCAN.—(1889). Dimensions.—350 × 58 × 23¼ feet = 6,620 tons. Guns.—Nil. H.P. 7,200 = 17.5 knots. Coal 1,347 tons.

Anti-Submarine School.—

GIBRALTAR.—(Old first-class protected cruiser). (1892). Dimensions.—387½ × 60 × 25 feet = 7,700 tons. Guns.—Four 4-inch. H.P. 10,000 = 15 knots. Coal 1,200 tons.

Repair Ship.—

ASSISTANCE.—(purchased 1900). Dimensions.—445¾ × 53 × 21¾ feet = 9,600 tons. Guns.—Four 3-pounders. H.P. 4,000 = 12 knots (f.d.). Coal 2,180 tons.



Lucia.

VALIANT

SURVEYING SHIPS.

BEAUFORT (Ailsa S.B. Co.), **CROZIER** (Simons), **FITZROY, FLINDERS** (Lobnitz), **KELLETT** (Simons) Belong to the later **" Hunt "** class of twin-screw mine-sweepers, and completed as Surveying Ships 1919.

Dimensions.—231 × 28½ × 7½ feet = 800 tons displacement.

Guns.—One 3-pounder.

Machines.—Vertical triple exp. engines 2,200 H.P. = 16 knots. Coal 185 tons. Complement 88.

CROZIER was transferred to the South African Government in 1921.

ENDEAVOUR.—(Fairfield, 1912). Dimensions.—241¼ × 34 × 11¾ feet = 1,280 tons displacement. Guns.—One 3-pounder. One machine. H.P. 1,100 = 13 knots. Coal 220 tons. Complement 130.

FANTOME, MERLIN.—Built at Sheerness Dockyard 1901. Old sloops of the **" Espiegle "** class. Dimensions.—210 × 33 × 11 feet = 1,070 tons. Guns.—One 3-pounder, two machine. H.P. 1,400 = 13.6 knots. Coal 195 tons. Complement 130.

MUTINE.—(Lairds, 1900). Old sloop, similar to the above. Dimensions.—204 × 33 × 11½ feet = 980 tons. Guns.—One 3-pounder, two machine. H.P. 1,400 = 13.4 knots. Coal 160 tons. Complement 134.

INVESTIGATOR.—(Vickers, 1907), 1,185 tons, and **PALINURUA.**—(Cammel-Laird, 1907), 444 tons, belong to the Royal Indian Marine.

PHOTOGRAPHS, pp. 187—188.

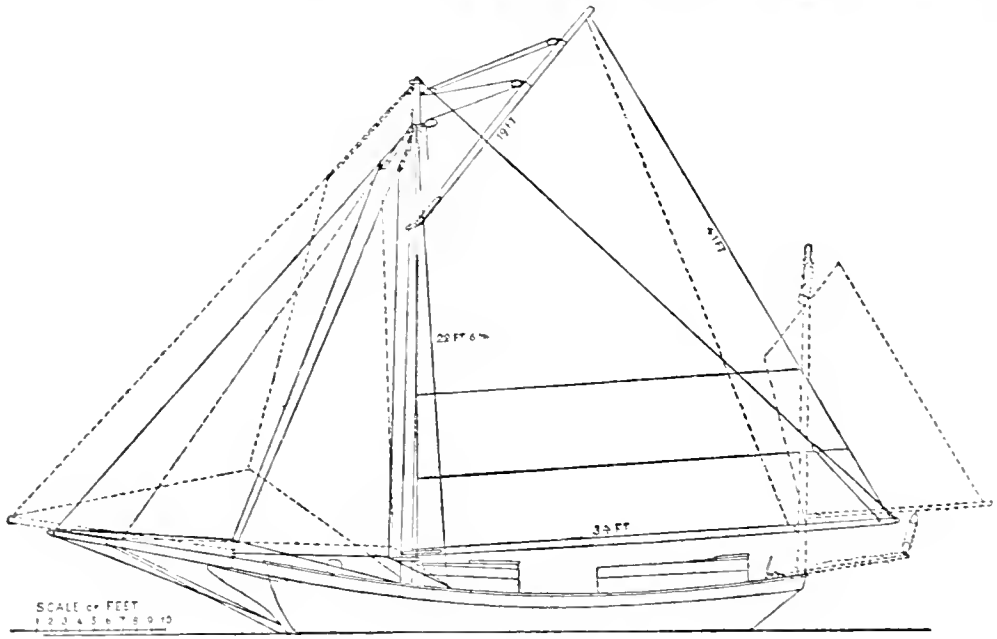
INDEX

FLINDERS. (*See page* 185)

ENDEAVOUR. (*See page* 185).

SAIL-PLAN OF THE "SPRAY"

From Captain Joshua Slocum's "SAILING ALONE AROUND THE WORLD." [See previous page]



Sail-plan of the *Spray*.

The solid lines represent the sail-plan of the *Spray* on starting for the long voyage. With it she crossed the Atlantic to Gibraltar, and then crossed again southwest to Brazil. In South American waters the bowsprit and boom were shortened and the jigger-sail added to form the yawling with which the rest of the trip was made, the sail-plan of which is indicated by the dotted lines. The extreme sail forward is a flying jib occasionally used, set to a bamboo stay fastened to the bowsprit. The manner of setting and bracing the jigger-mast is not indicated in this drawing, but may be partly observed in the plans on pages 287 and 289.

"Interesting and exciting."—
Glasgow Herald.

"The record of one of the most unique and fascinating single-handed voyages that was ever made."—
Dundee Courier.

"Very interesting, and lovers of healthy adventure will extend it a warm welcome."—
Cardiff Western Mail.

ANN